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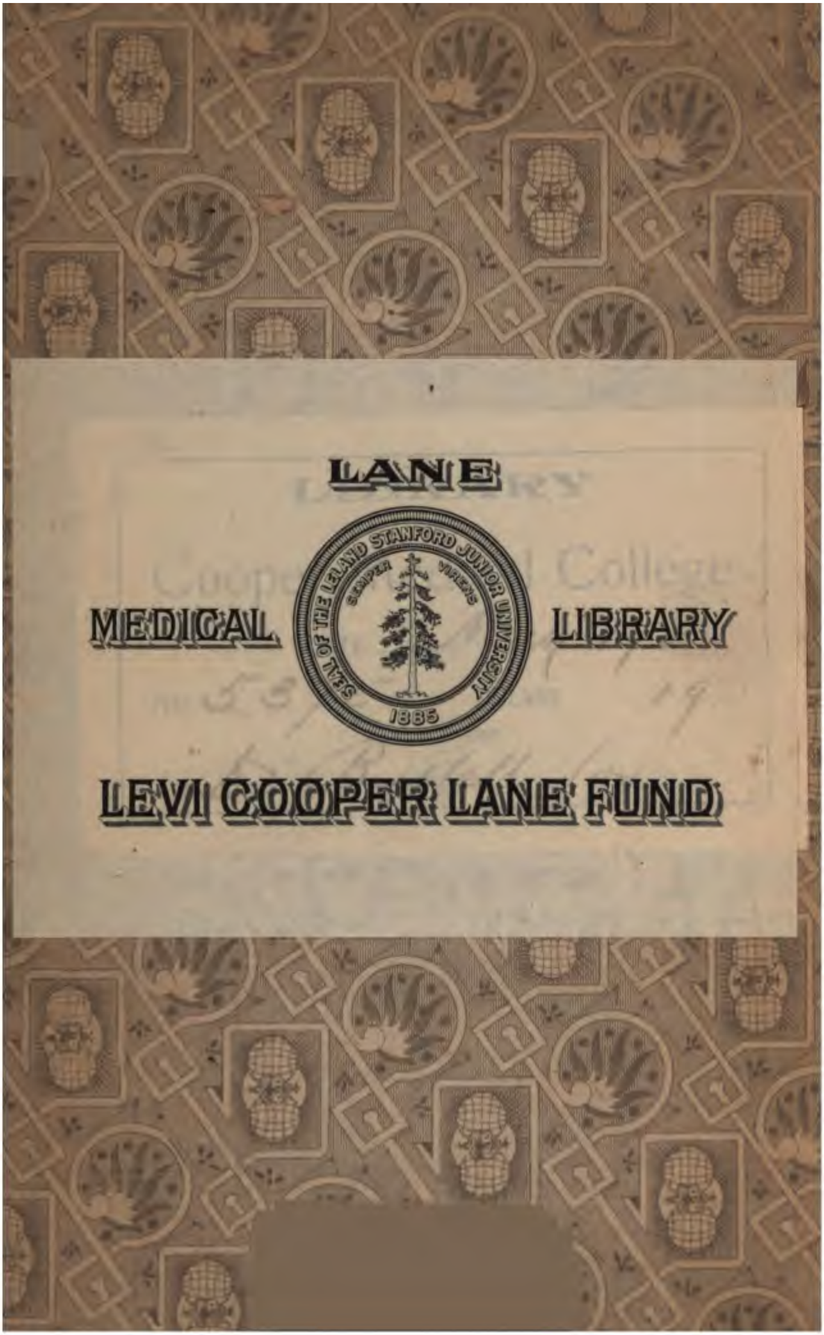

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OBSTETRIC SYNOPSIS.

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BY

JOHN S. STEWART, M. D.,

Demonstrator of Obstetrics, and Chief Assistant in the Gynecological Clinic of the
Medico-Chirurgical College of Philadelphia.

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INTRODUCTORY NOTE.

By WILLIAM S. STEWART, A.M., M.D.,

Professor of Obstetrics and Gynecology in the Medico-Chirurgical College, Philadelphia.

THIS little volume has been prepared under my immediate supervision and is to a great extent the result of accurate note-taking for a number of years of my lectures on Obstetrics, delivered before the students of the Medico-Chirurgical College.

In the preparation of the *Synopsis* all of the leading works on the subject have been consulted—those of *Playfair*, *Parvin*, *Lusk*, *Galabin*, and *Cazeaux and Tarnier* having been given the preference.

In addition to the latest teachings of these *Authors*, which have been given with the amount of detail possible and consistent with the aim and scope of the work and as far as they correspond with the teachings given my own classes from year to year, the field of recent journalism has been searched and some valuable suggestions and opinions thus obtained.

The *Obstetrical Nomenclature* suggested by Professor Simpson of Edinburg and adopted by the Section of Obstetrics of the Ninth International Medical Congress held in Washington, D. C., September, 1887, has not been strictly observed; but for the benefit of those who may not be familiar with it the *Nomenclature*, as adopted, has been inserted in the form of an *Appendix*.

The work is specially designed to assist the undergraduate in acquiring a thorough knowledge of this department, being so systematically arranged that at a glance he may readily inform himself on any point pertaining to the study. However, not being exhaustive, it is intended only as a stepping-stone to the many excellent but voluminous text-books, for the perusal of which faithful attendance on the various lectures and practical courses of most colleges unfortunately leaves the student little or no time.

With its help in addition to the lectures it is believed any one can become familiar not only with the principles of *Obstetrics*, but with many of the practical points pertaining thereto.

It is neither intended nor possible for this small work to take the place of the various text-books during the college career; but it is most earnestly hoped that it may for the student economize time, give a comprehensive view of the subject, and incite a desire for the knowledge of the details.

1801 Arch Street, Philada.

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PART I.

ANATOMY.

CHAPTER I.

ABDOMEN.

If two parallel lines are drawn around the body, the one passing over the cartilages of the ninth ribs and the other on a level with the highest points of the ilea, the abdomen is divided into three zones. By drawing from the cartilages of the eighth ribs to the middle of Poupart's ligaments two parallel intersecting lines, nine regions are outlined as follows:—

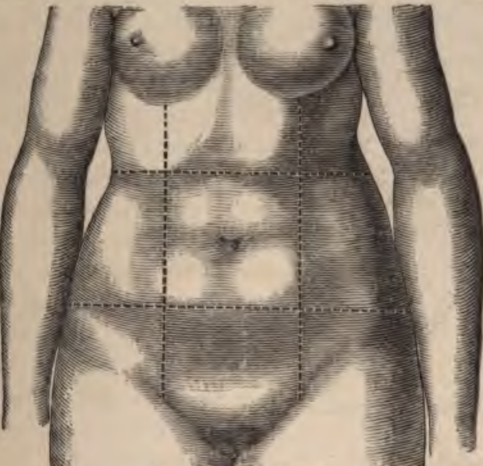

Fig. 1.—The abdomen.

Right hypochondriac; Epigastric; Left hypochondriac; Right lumbar; Umbilical; Left lumbar; Right iliac; Supra-pubic (*Hypogastric*); Left iliac.

CHAPTER II.

BREASTS.

Two compound racemose (*in clusters*) glands, situated on either side of the sternum, over the pectorales majora muscles, and extending from the third to the sixth or seventh ribs. In the male, and in the female prior to puberty, they are rudimentary, but complete development is not attained until the period of lactation following pregnancy.

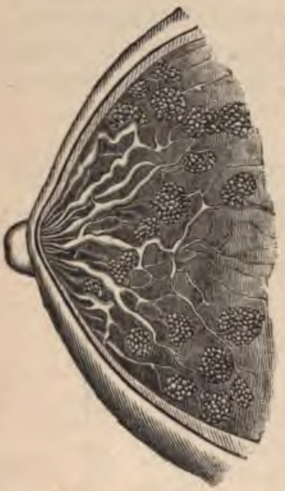

FIG. 2.—Mammary gland.

Each gland is composed of fifteen to twenty lobes; the lobes are subdivided into lobules, and these in turn are made up of a number of acini or *culs-de-sac*. From each of the latter a small canaliculus starts; by the union of these the canals of the lobules are formed; the latter anastomosing to form the galactophorous (or *lactiferous*) ducts, the canals of the lobes, which terminate at the nipple in small openings.

As they approach the nipple the lactiferous ducts become widely dilated and form reservoirs in which the milk is stored; in the nipple they again contract.

The *glands* are covered with layers of connective and adipose tissue; the skin over them is supplied with sudoriparous and sebaceous glands and hair follicles.

The *nipple* is situated at the summit of each breast, and varies greatly in size in different women, being sometimes depressed below the surface; at the bases of the papillæ which are found upon it the orifices of the lactiferous ducts open.

The *areola* immediately surrounds the nipple, and is one to two inches in diameter; it is generally more conspicuous in brunettes. In addition to the sebaceous glands, which the skin of the areola contains, a number of small projections (twelve to twenty)—the glands or tubercles of Montgomery—are to be found upon its surface. These projections, which are thought by some to be rudimentary nipples, are generally classified as sebaceous glands; and although they are at all times visible in the majority of cases, pregnancy renders them, as well as the areolæ, more conspicuous.

CHAPTER III.

PELVIS.

I. BONES.—The bones of the pelvis (*basin*) are as follows: Ossa innominata (two), sacrum, and coccyx.

(*a*) **Each Os Innominatum** consists of three parts, called *ilium*, *ischium*, and *pubes;* these unite in the *acetabulum*, union not being complete until after the eighteenth or twentieth year.

(*b*) **The Sacrum** is pyramidal in shape, and originally consists of five parts,—the anterior and posterior sacral foramina indicating the lines of separation.

(*c*) **The Coccyx** is a triangular bone, formed of three, four, or five rudimentary vertebræ.

2. ARTICULATIONS.—The joints of the pelvis are: Sacro-lumbar, sacro-iliac (two), sacro-coccygeal, and pubic.

The form of articulation is generally described as *symphysis* or *amphiarthrosis*,—but more recent investigations show that in many cases (the sacro-lumbar joint excepted) they are true *arthrodia*, the opposing surfaces being covered with cartilage, and lined with synovial membranes, thus permitting a sliding motion.

During pregnancy the ligaments become softened and the synovial fluid is increased, causing a wider separation of the bones and a greater mobility.

3. CAVITY.—The ileo-pectineal line divides the cavity into an upper or *false pelvis* and a lower or *true pelvis;* the former includes all that is above the brim, and is chiefly for the attachment of muscles, while the latter contains the organs of generation, and is therefore of more importance to the obstetrician.

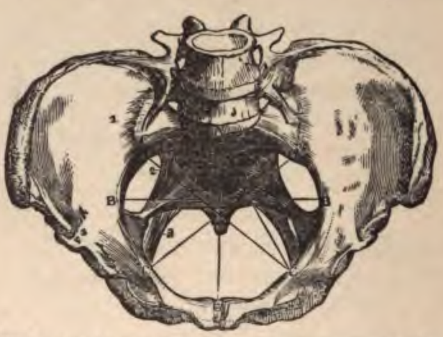

FIG. 3.—The pelvis (true and false).—A A, Antero-posterior diameter; B B, transverse diameter; C C, two oblique diameters; 1, sacro-iliac ligament; 2, anterior or lesser sacro-sciatic ligament; 3, posterior or great sacro-sciatic ligament.

(*a*) **Measurements.** The measurements of the pelvis are those of the false pelvis, called external measurements, and those of the true pelvis, called internal measurements.

The *external measurements* are as follows (Playfair):—

1. Between the anterior superior iliac spines, 10 inches.

2. Between the middle points of the iliac crests, 10½ inches.

3. Between the spinous process of the last lumbar vertebra and the symphysis pubis (external conjugate), 7 inches.

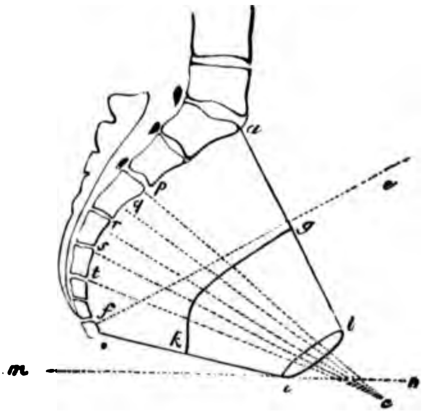

Fig. 4.—The pelvic cavity (planes and axis).—*ab*, Plane of the superior strait (brim); *oi*, plane of the inferior strait (outlet); *c*, the point where these two planes would meet, if prolonged; *mn*, a horizontal line; *ef*, axis of brim; *gk*, axis of cavity; *p q r s t*, various points taken on the sacrum to show the plane of the cavity at each point.

The *internal measurements* or diameters of the true pelvis are as follows (Playfair):—

	Antero-posterior.	Oblique.	Transverse.
1. Brim .	. 4.25 inches.	4.8 inches.	5.2 inches.
2. Cavity	. 4.7 "	5.2 "	4.75 "
3. Outlet	. 5.0 "		4.2 "

The transverse diameter being the largest at the brim, the oblique in the cavity, and the antero-posterior at the outlet.

During life these diameters are diminished one-quarter to half an inch by the soft parts which cover and cushion the bones.

(*b*) **Planes.** The planes of the pelvis are imaginary levels at any portion of its circumference. The inclination of the plane of the pelvic brim to the horizon is about 60°, while that of the outlet is about 11°.

(*c*) **Axis.** The axis of the pelvis (*curve of* Carus) is an irregular parabolic line, indicating the direction which the fœtus takes during expulsion, and is represented by the sum of the axes of an indefinite number of planes at different levels of the cavity.

4. DIFFERENCES IN THE SEXES.—The bones of the female pelvis are lighter in structure and the prominences for muscular attachment are less marked; the iliac bones are more spread out and the tuberosities of the ischia are further apart, giving greater breadth to the figure and causing the side-to-side movement which females have in walking. The depth of the symphysis pubis is less, and the angle of the pubic arch, the edges of which are everted, is greater, being 90° to 100°, instead of 60° to 75°, which it is in the male.

The sacrum is wider, has a more regular curve, and its promontory does not project so far. The obturator foramina are larger, and, according to some authorities, triangular, being oval in the male. The cavity is wider, but not so deep, while the inlet is elliptical instead of triangular or heart-shaped.

The joints are not so firmly united, and the synovial sacs are larger and more distinct, being rarely absent, as they often are in males.

5. CONTENTS.—The contents of the pelvis are as follows: Internal genital organs and their appendages, together with the rectum and bladder, all of which are invested by peritoneum; iliacus and psoæ muscles on either side of the upper or false pelvis, cushioning the bones and lessening the diameter of the inlet; pyriformes and obturatores interni, small portions of each being within the cavity of the pelvis, and supposed by some to assist in the rotation of the fœtal head; crural and obturator nerves (from the lumbar plexus), the sacral plexus, with its branch, the sacro-sciatic, and the pelvic ganglia of the sympathetic system; the following arteries, ovarian and middle sacral (from the aorta), hemorrhoidal, external iliac, internal iliac and its branches the vesical, uterine, vaginal, obturator, internal pudic, and sciatic. These contents are connected by cellular tissue and the pelvic fascia.

6. FLOOR.—The outlet of the pelvis is closed by a muscular floor composed of two pairs of muscles, the levator ani and coccygeus on either side; between them, at their juncture in the median line, are the openings for the urethra, vagina, and rectum.

The *levator ani* arises anteriorly from the pubic ramus, posteriorly from the ischial spine, and between these points from the pelvic fascia; its fibres pass downward and inward, and are inserted at the base of the bladder and tip of the coccyx, uniting with the muscle of the opposite side in the median line where they are attached to the walls of the vagina and rectum.

The *coccygeus* arises from the spine of the ischium, and is attached to the border of the coccyx and the lower part of the side of the sacrum.

A line drawn across this region in front of the tuberosities of the ischia, divides the pelvic floor into two *triangles*, an *anterior* or *urethral*, and a *posterior* or *rectal triangle.*

(*a*) **Urethral triangle.** In the anterior or urethral triangle are the following structures:—

(1) *Erectores clitoridis* (two), arising from the inner side of each ischial tuberosity, and meeting in front of the pubic joint to form the body of the clitoris.

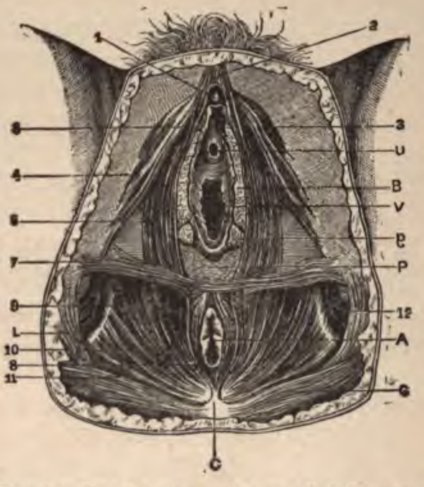

FIG. 5.—The pelvic floor (triangles).—A, Anus; B, bulbi-vaginæ; C, coccyx; G, gluteus maximus muscle; L, great sacro-sciatic ligament; P, perineal body; U, urethra; V, vagina; g, vulvo-vaginal gland; 1, clitoris; 2, its suspensory ligament; 3, crura clitoridis; 4, erector clitoridis muscle; 5, bulbo-cavernosus muscle; 7, transversus perinei muscle; 8, sphincter ani; 9 and 10, levator ani muscle; 11, coccygeus muscle; 12, obturator externus muscle.

(2) *Bulbo-cavernosi* (two), muscular slips which spring from the perineal body, pass around the vaginal orifice and divide into three portions which terminate as fol-

lows: one to the under surface of the corpus cavernosum of clitoris, another to the posterior surface of bulb, the third blending with the mucous membrane of the vestibule.

(3) *Bulbi-vaginæ* (two) (*corpora-cavernosa urethræ*), small masses of erectile tissue on each side of the vagina and partly covered by its sphincter. They blend anteriorly, forming the *pars intermedia* which unites the clitoris and its glans.

(4) *Vulvo-vaginal glands* (two) (*glands of* Bartholin), analogous to Cowper's glands in the male, and lying at each side of the vaginal orifice just posterior to the bulb. Each gland is supplied with a duct which opens in front of the attached edge of the hymen, or at the base of one of the carunculæ myrtiformes.

(*b*) **Rectal triangle.** In the posterior or rectal triangle is situated the sphincter ani muscle, beneath which lie portions of the levatores ani and coccygei.

The *transversus perinei* muscles (two), arising from the ischial tuberosities on each side unite in the median line where they are inserted into the perineal body; they divide the pelvic floor into its two triangles and form the bases of each.

The *perineal body* is a triangular mass of connective tissue lying between the lower portions of the vagina and rectum. Its use is as a support; to it the following muscles are attached: sphincter ani, levator ani, transversus perinei, and bulbo-cavernosi.

CHAPTER IV.

EXTERNAL GENITAL ORGANS.

THE external genital organs (*pudendum*) consist of the following parts: *Mons veneris*, *vulva*, and *perineum*.

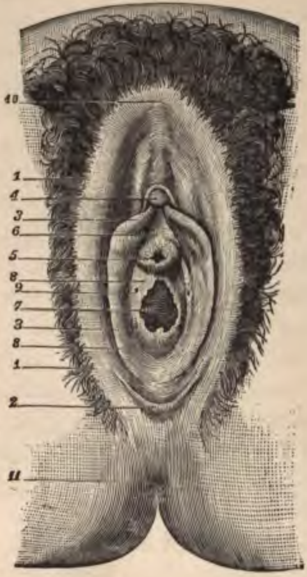

FIG. 6.—External genital organs.—1, Labia majora; 2, fourchette; 3, labia minora; 4, clitoris; 5, meatus urinarius; 6, vestibule; 7, orifice of vagina; 8, hymen; 9, orifice of duct of vulvo-vaginal gland; 10, anterior commissure; 11, anus.

I. MONS VENERIS.—An eminence at the base of the hypogastric region; it is composed of integument which contains a large number of hair follicles and sebaceous glands, connective and adipose tissue. The hair makes its appearance at puberty, its probable use being to protect the vulva from irritation produced by profuse perspiration.

2. VULVA.—A general term, comprising all the parts between the mons veneris and perineum, which are as follows:—

(*a*) **Labia majora** (*externa*). Two folds of skin extending from beneath the mons veneris to the anterior part of the perineum; they form by their union in front the *anterior commissure*, and by their union behind the *posterior commissure* which is generally described as the *fourchette*. They contain sebaceous glands, and externally are covered with hair; the internal surfaces are smooth, and resemble mucous membrane.

In the virgin the labia are firm and in apposition, but after labor or repeated coitus, and in old age, they become separated from relaxation.

(*b*) **Labia minora** (*interna*) **or nymphæ.** Two smaller folds commencing near the middle of each external lip, and converging near the clitoris where they bifurcate, the lower division forming the frænum or suspensory ligament of the clitoris and the upper its prepuce. They are sometimes described as meeting posteriorly and forming the *fourchette*.

Although partly covered with epithelium, and in appearance like a mucous surface, they are probably delicate skin (or muco-cutaneous). Beneath the surface are a large number of sebaceous glands.

In the virgin they are normally concealed; after labor, repeated coitus, or in old age they are exposed on account of separation of the labia majora, but continued irritation will sometimes cause hypertrophy and protrusion.

(*c*) **Clitoris.** A small elongated body analogous to the penis of the male. It is situated beneath the anterior commissure, and consists of two crura, a body, and a glans.

(*d*) **Vestibule.** A triangular mucous surface, the vaginal orifice forming its base and the nymphæ its sides, while the clitoris occupies the apex.

(*e*) **Meatus urinarius.** The urethral orifice is situated near the base of the vestibule; the irregular elevations surrounding it, and the projections at its lower margin are guides for the introduction of the catheter.

(*f*) **Vaginal orifice.** In virgins a circular opening, in others a transverse fissure.

(*g*) **Hymen.** A thin fold of mucous membrane which in virgins and most nulliparæ partly or entirely closes the vaginal orifice. Its shape is usually *crescentic*, but may be *annular*, *fimbriated*, *cribriform*, or *imperforate.*

(*h*) **Carunculæ myrtiformes.** Fleshy tubercles, the remains of the ruptured hymen. It has been affirmed by some that they are seldom, if ever, found except after labor. When inflamed they may be mistaken for syphilitic vegetations.

(*i*) **Fossa navicularis.** A depression between the hymen and the fourchette; as the inner surface of the fourchette is normally in contact with the hymen, the fossa is concealed, but can be exposed by depressing the fourchette.

The glands of the vulva are of three varieties: sudoriparous, sebaceous, and muciparous glands or follicles.

Sudoriparous glands are found in the external parts, chiefly in the labia majora.

Sebaceous glands are very numerous in both labia (majora and minora), and secrete an odorous fluid which may become offensive in untidy persons.

Muciparous glands are about the vaginal orifice, the vulvo-vaginal (*glands of* Bartholin) being the largest of this variety.

3. PERINEUM.—The space between the posterior commissure and the anus; beneath the integument is the perineal body.

The *blood-supply* of the pudendum is derived from the pudic and epigastric arteries.

The *nerves* are branches of the external pudic and of the lumbar plexus.

CHAPTER V.

INTERNAL GENITAL ORGANS.

THE internal genital organs consist of the following parts: *Vagina, uterus, Fallopian tubes, ovaries.*

I. VAGINA.—A curved canal lying in the axis of the pelvis and connecting the uterus with the external generative tract. Its length varies greatly, and is from two and a half to four inches, the posterior wall being about half an inch longer than the anterior. The walls being in apposition make it a transverse slit, which, as it approaches the uterus, becomes more capacious and terminates in the *anterior* and *posterior culs-de-sac.*

In front of it are the bladder and urethra; behind, the rectum and perineal body, all the parts being united by loose connective tissue. At its upper and posterior border it is separated from the rectum by the peritoneal pouch called *Douglas' cul-de-sac.*

The vagina consists of three layers, an external of connective tissue, a middle or muscular, and an internal or mucous.

The *external layer*, being connective tissue, supports the vagina by attaching it to the surrounding parts.

The *muscular layer* is of the unstriped variety and consists of longitudinal, oblique, and circular fibres, which are inserted below in the ischio-pubic rami, being continuous above with the middle muscular layer of the uterus. The vaginal columns are thickened ridges in the lower portions of the anterior and posterior walls, those in the anterior wall being the more prominent.

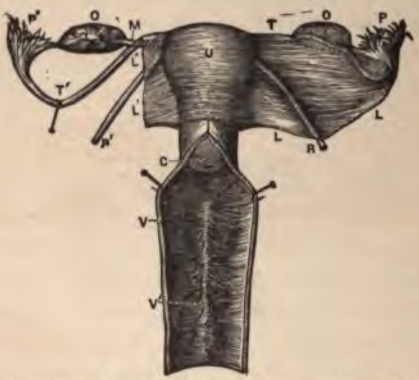

FIG. 7.—Internal genital organs —U, Uterus (anterior surface); O O′, ovaries; P P′, fimbriæ; C, intra-vaginal portion of cervix; R R′, round ligaments; V V′, vagina laid open; L L′, broad ligaments; M, ovarian ligament; T T′, Fallopian tubes.

The *mucous layer* is covered with cylindrical and pavement epithelium and numerous vascular papillæ; it contains a few mucous glands, the secretion of which is acid. The mucous membrane, especially at the lower part of the anterior wall, is thrown into transverse folds or elevations called *rugæ;* they are more distinct in the virgin, and increase the sensibility of the surface.

The *vaginal blood supply* is derived from the vaginal, uterine, vesical, and pudic arteries, branches of the internal iliacs.

The *veins* are valveless and plexiform.

The *nerves* are from the hypogastric plexus.

2. UTERUS.—The organ of gestation and parturition; it is pear-shaped, but flattened from before backward, and situated in the true pelvis with the fundus just below the brim. In front is the bladder, and behind the rectum, each of which, by its fullness or emptiness, affects the situation of the uterus.

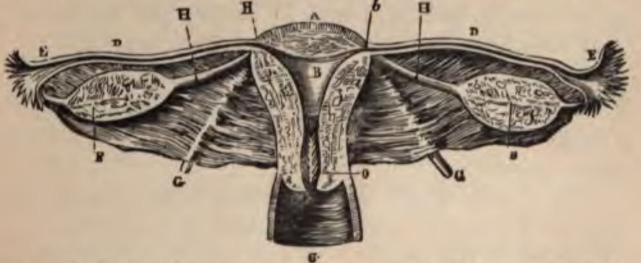

FIG. 8.—Section of internal genital organs (cavity of uterus and Fallopian tubes).—A, Fundus; B, cavity of body of the uterus; O, cavity of cervix; D D, canals of Fallopian tubes cut open; E E, fimbriated extremities laid open; F F, ovaries, one-half of each removed so as to bring into view several Graafian follicles; G, cavity of vagina; H H, ovarian ligaments; G G, round ligaments.

	Length.
In the virgin	2½ inches.
In the multipara	3 "
At full term of gestation	12 to 14 "
	Weight.
In the virgin	1 ounce.
In the multipara	1½ ounces.
At full term of gestation	24 to 28 "

The size and weight of the uterus are slightly increased during each menstrual period.

(*a*) **Regions.** The uterus consists of a fundus, body, and cervix or neck.

The *fundus* is the portion above the insertions of the Fallopian tubes.

The *body* is the portion between the Fallopian tubes and the constriction near the middle of the organ which corresponds with the internal os.

The *cervix* or *neck* is the remaining portion which is limited above by the internal os and below by the external os. The intra-vaginal portion of the cervix varies greatly in length and in shape, but the anterior lip is usually more prominent than the posterior.

(*b*) **Cavity.** The cavity of the uterus is small compared with the size of the organ, and consists of two compartments, an *upper*, within the body, and a *lower*, within the cervix.

The *cavity* of the *body* communicates at each side with the Fallopian tubes and below is continuous with the cavity of the cervix. In the virgin or nullipara it is triangular with its opposing convex surfaces in apposition; in the multipara it is larger and more ovoid.

The *cavity* of the *cervix* is fusiform, and larger in the nullipara than it is after labor.

(*c*) **Structure.** The uterus consists of three layers, an external serous or peritoneal, a middle or muscular, and an internal or mucous.

The *serous coat* (*layer*) is reflected from the bladder and covers the upper three-fourths of the anterior surface, extending as far down as the internal os. On the posterior surface it descends as far as the insertion of the vagina, on which it extends for a short distance and is then reflected upon the rectum, forming the floor of *Douglas' cul-de-sac.* In front and behind it is very adherent to the uterine walls, but laterally the attachments are quite loose. Most of the uterine ligaments are folds of peritoneum.

The *muscular layer* is of the unstriped variety, and consists of longitudinal, irregular, and circular fibres.

The *external* or *longitudinal* fibres are chiefly upon the posterior wall, at the upper part of which they run transversely, and are continuous with the muscular tissues of the Fallopian tubes, broad, round, ovarian, and sacro-uterine ligaments.

The *middle* fibres form the bulk of the muscular tissue of the uterus; running upward, they decussate and unite with each other so that the superficial become the deep, and *vice versâ.* They encircle the large veins and check hemorrhage by their contractions.

The *internal* or *circular* fibres consist of rings which begin around the openings of the Fallopian tubes; the circles become wider until they meet on the body of the uterus, extending as far as the internal os, where they form a *sphincter.*

The muscular tissue of the cervix is formed of the external and internal fibres.

The *mucous layer* is of two varieties, that of the body and that of the cervix. The *mucous membrane* of the *body* is a pale pink, and covered with cylindrical ciliated epithelium and glandular secretion of alkaline reaction.

During menstruation it enlarges to two or three times the ordinary size, and loses its layer of epithelium. The entire surface is perforated by the ducts of the *utricular glands,* which are very numerous.

The *mucous membrane* of the *cervix* is firmer and more transparent, and is covered with cylindrical and pavement epithelium. The glands, which here also are very numerous, are racemose, not tubular as are those of the body.

During pregnancy the cervical canal is frequently filled with a plug of alkaline mucus which these glands secrete.

The *ovula Nabothii* are retention cysts caused by obstruction of the excretory ducts and accumulation of the secretions.

The *arbor vitæ* consists of longitudinal ridges in the anterior and posterior walls from which branches are given off in an oblique direction; this appearance is most distinct in the virgin.

(*d*) **Differences in the virgin and multipara.** The *virgin* or *nulliparous* uterus is smaller and more compact; the fundus is more flattened; the cervix is longer, especially the intra-vaginal portion, which is regular in outline and more or less conical; the external os is a short transverse slit or small rounded opening, its edges being, in the multipara, irregular and fissured with an orifice sufficiently patulous to admit the tip of the finger.

In addition to the differences before mentioned, in the shape and size of the cavities of the body and cervix, there is also a difference in their relative sizes; the cavity of the cervix, which in the virgin is slightly the larger, becoming after labor the smaller of the two cavities. In the virgin the *arbor vitæ* is more distinct.

(*e*) **Anomalies.** The most common anomaly is a double or partially double uterus; the vagina may be double also, each one leading to a separate uterus, and, in some rare cases, to a single one.

In such cases pregnancy can occur in one or both of the cavities; in the latter instance there may be considerable development of one ovum before the second impregnation occurs. A knowledge of the development of the uterus in fœtal life explains the occurrence of these anomalies.

During a part of this period the *Wolffian bodies*, a series of fine tubes emptying into a common duct and acting as temporary kidneys, are situated on either side of the vertebral column. From them and along their external borders two hollow canals are formed; the *canals of Müller*, which empty into the same common outlet. The Wolffian bodies soon atrophy, the *parovarium*, a series of fine tubes arranged in pyramidal form in the substance of each broad ligament, being the only remains. The *canals of Müller* gradually approach each other, and their lower portions lying side-by-side in close apposition become, by the absorption of the partition, a single organ with a single cavity—the uterus.

The canals remain widely separated, and eventually become the Fallopian tubes. Any interference in the progress of this development may prevent absorption of the partition, and thus produce one or more of the anomalies mentioned.

(*f*) **Ligaments.** The ligaments which support the uterus are eight—two broad, two round, two vesico-uterine, and two utero-sacral.

The *broad ligaments* are double folds of peritoneum which extend from the sides of the uterus to the sacro-iliac joints; passing over its anterior and posterior surfaces they meet in the median line and divide the pelvic cavity into two unequal parts. Upon the upper border of each ligament are three folds or wings—an anterior inclosing the round ligament, a middle inclosing the Fallopian tube, and a posterior which incloses the ovary and its ligament. The broad ligaments contain muscular tissue derived from the external or longitudinal uterine fibres, between their folds are the uterine and ovarian vessels, lymphatics, and nerves.

The *round ligaments* are muscular cords enveloped by the anterior wings of the broad ligaments; they extend from the upper borders of the uterus to the inguinal canals through which they pass, and blend with the cellular tissue of the labia majora. By their contractions during labor and sexual intercourse the upper portion of the uterus is drawn forward.

The *vesico-uterine ligaments* are folds of peritoneum connecting the body of the uterus with the fundus of the bladder.

The *utero-sacral ligaments* are folds of peritoneum connecting the posterior surface of the uterus with the sacrum, thereby affording considerable support. In its normal position the uterus is slightly anteverted, but can be readily displaced in any direction. During pregnancy all of the ligaments are put upon the stretch, but return to their natural size shortly after delivery.

The *blood-supply* of the uterus is derived from the uterine and ovarian arteries and from branches of the epigastrics contained within the round ligaments.

The *veins* are very large, valveless, and anastomose freely; during pregnancy they increase in size and are called sinuses; passing out of the uterus at its sides, and uniting with the ovarian and vaginal veins, they form between the folds of the broad ligaments the "*pampiniform plexus.*"

The *lymphatics* arise from the large lymph spaces so numerous at the base of the mucous membrane of the uterus. They unite with the vessels arising from the muscular and peritoneal layers and pass out between the folds of the broad ligaments.

The *nerves* are derived mainly from the sympathetic ganglia; the sacral nerves from the cerebro-spinal system send numerous branches to the cervix, a few of which are also distributed to the body of the uterus.

3. FALLOPIAN TUBES.—The excretory ducts of the ovaries; they consist of two tubes contained in the middle wings of the broad ligaments, and pass from the upper angles of the uterus for a distance of three to five inches, terminating in expanded extremities which are surrounded by fringe-like processes—the *fimbriæ* (*tentacles*). One of the fimbriæ larger than the rest is attached to the surface of the ovary (*tubo-ovarian ligament*).

The diameter of the tube increases from its uterine end, where it measures one-twenty-fifth to one-fifteenth of an inch, to the fimbriated extremity, where it is widely expanded. Each tube consists of three layers—an external or peritoneal, a middle or muscular, and an internal or mucous.

The *peritoneal layer* extends as far as the fimbriated extremity, where it is in contact with the mucous membrane, the only instance in the body of such a union.

The *muscular layer* consists of longitudinal and circular fibres continuous with those of the uterine walls.

The *mucous layer* is thrown into a number of longitudinal folds and is covered with ciliated epithelium, the action of the cilia being toward the uterus.

4. OVARIES.—Two bodies analogous to the testicles of the male; they are situated on either side of the uterus in the posterior wings of the broad ligaments, and, except during pregnancy or when displaced from other causes, lie just below the plane of the pelvic brim. They are attached to the uterus by the *utero-ovarian* ligaments, and to the tubes by the large fimbriæ, called *tubo-ovarian* ligaments. In shape they are ovoid, flattened from before backward and on the lower surface, but convex above. The size varies greatly, as, during menstruation and pregnancy, they become nearly twice as large as they are at other times. The average measurements are, length one and a quarter to one and a half inches, depth one-half inch, thickness one-half to three-quarters of an inch. The average weight is one and a half to two drachms.

Before puberty the surfaces are smooth, but after ovulation has commenced they become uneven from the cicatrices of ruptured ovisacs; in old age they are wrinkled and atrophied.

The ovaries are covered with a layer of cylindrical epithelium derived from the peritoneum; beneath this is a fibrous envelope called *tunica albuginea*, the existence of which as a separate structure has been disputed, being, it is claimed, the outer part of the ovarian tissue.

The *tissue proper* (*stroma*) consists of an external or cortical, and an internal, bulbous or medullary portion, the former containing the ovisacs while the latter is vascular in structure and forms the bulk of the stroma.

The *blood supply* of the ovary is derived from the ovarian and uterine arteries, the numerous branches of which have entrance at its lower border. Passing to the medulla they send small branches to the cortical portion and to the walls of the ovisacs which have commenced to enlarge.

The *veins* emerge at its lower border; here they are very large and varicose in appearance and form an erectile plexus, the *bulb* of the ovary.

The *lymphatics* are large and follow the course of the other vessels.

The *nerves* are from the ovarian plexus of the sympathetic.

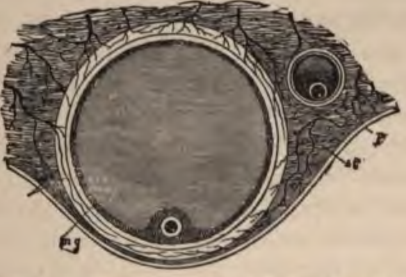

FIG. 9.—Section of two Graafian follicles of different sizes.—*p*, Peritoneal or quasi-peritoneal covering; *st*, ovarian stroma (cortical portion); *ov*, the two outer layers of the ovisac called tunica fibrosa and tunica propria; *mg*, membrana granulosa. Around the ovum the accumulated cells are seen forming the discus proligerus. (Enlarged about eight diameters.)

(*a*) **Ovisacs.** Each ovary it is estimated contains from 30,000 to 300,000 *ovisacs* or *Graafian follicles*, which, in their undeveloped state, measure $\frac{1}{1250}$ of an inch in diameter. At puberty fifteen to twenty of them, of varying sizes, become visible to the unaided eye, and some maturing more rapidly than others approach the surface of the ovary and cause projections upon it. One of these, becoming larger than the rest and having caused a projection measuring at its base about one-half inch in diameter, bursts and permits the escape of the ovule.

The ovisac from without inward is composed of the following layers :—

(1) *Tunica fibrosa.*

(2) *Tunica propria.*

(3) *Membrana granulosa*, a layer of round nucleated cells which line the wall of the follicular cavity.

(4) *Discus proligerus*, an accumulation of the cells of the membrana granulosa around the ovule.

(5) *Liquor folliculi*, a transparent fluid formed from the cells lining the follicular cavity.

(*b*) **Ovules.** The ovules are developed from the germ epithelium which covers the surfaces of the ovaries. During fœtal life these cells become embedded in the ovarian stroma by a dipping process; subsequently each one is surrounded by a growth of delicate connective tissue from the ovarian stroma, the *ovisac.*

The ovule is attached to the inner surface of the ovisac, and is surrounded by a layer of cells distinct from the discus proligerus in which it lies. At the time of its escape from the ovisac the ovule measures $\frac{1}{120}$ of an inch in diameter.

From without inward it is composed of the following layers and parts :—

(1) *Zona pellucida* or *vitelline membrane.*

(2) *Vitellus* or *yelk.*

(3) *Germinal vesicle* (*nucleus*).

(4) *Germinal spot* (*nucleolus*).

PART II.

PHYSIOLOGY.

CHAPTER I.

PUBERTY, OVULATION, AND MENSTRUATION.

1. PUBERTY.—The period at which reproduction is first possible. In the female it occurs earlier than in the male, and the accompanying changes are more marked. The whole body enlarges, especially the pelvis and breasts, the figure becomes more symmetrical, and the carriage more graceful. The external genitals are developed, and covered externally by a growth of hair. The demeanor is changed to one of dignity, modesty, and reserve. In short, the *girl* becomes a *woman*.

The most important of all the changes are those which affect the internal genital organs, but these changes can be studied in connection with *ovulation* and *menstruation*.

2. OVULATION.—A process which is repeated at longer or shorter intervals between puberty and the menopause, except during gestation, when it is normally suspended. At the age of puberty the ovaries increase in size and enter upon the discharge of their special function. Before this period the ovisacs undergo no change of size; but now, stimulated by the new impulse given the entire system, and especially the generative tract, fifteen to twenty of them, as has been mentioned, commence to grow and gradually increase in size until they form projections upon the ovarian surfaces, the great expansion of their walls being due to an increase in the quantity of the liquor folliculi. When the pressure from within has become too great for the walls, or when there is a special excitation produced by sexual intercourse, the sac bursts and its contents escape.

That ovulation is strictly periodical, and that it occurs only in connection with menstruation, is not generally believed. Some authorities maintain that increased or diminished blood supply regulates the rapid or slow maturing and rupture of the follicle; others, that the maturing of the follicle is the cause of the periodical congestion and hemorrhage. Cases are on record in which ovulation has occurred without menstruation, and *vice versâ*.

After rupture the walls of the follicle collapse and its cavity becomes filled with a small quantity of blood or lymph; surrounding this central clot is an oval convoluted ring, the convolutions being composed of the hypertrophied cells of the membrana granulosa; this is called *corpus luteum* (*false*). The folds increase in size until they fill the follicular cavity and form a whitish stellate cicatrix which generally disappears in less than *forty days* from the period of rupture and leaves but a slight depression.

When impregnation of the discharged ovule has occurred the ovary is stimulated to increased growth, and the *corpus luteum* (*true*), instead of contracting and disappearing as described, continues to grow until the *third* or *fourth month of pregnancy*. At this period and sometimes earlier it begins to atrophy, this process being completed in from *one* to *two months after delivery*.

As a sign of pregnancy the corpus luteum (yellow body) is not altogether reliable.

3. MENSTRUATION (*catamenia, etc.*).—A periodical discharge of blood from the mucous membrane of the uterus, normally occurring every twenty-eight days, but generally suspended during pregnancy and lactation.

At the age of puberty when ovulation commences menstruation makes its first appearance, the average age at which it is established being from thirteen to fifteen years. At first it does not recur with any regularity, and is accompanied by pains in the back and breasts and a sense of general discomfort, while the amount of the discharge is usually slight.

Its early or late establishment is influenced by *climate*, *race*, and *surroundings.*

(*a*) **Climate.** Girls brought up in warm or tropical climates menstruate earlier than those who have lived in colder ones.

(*b*) **Race.** The descendants of natives of warm climates habitually menstruate earlier, even after removal from such influences.

(*c*) **Surroundings.** Children of a highly developed nervous organization, the result of luxury or premature stimulation of the mental faculties, menstruate earlier than those who are country-bred or of the poorer classes.

The menstrual fluid consists of red and white blood globules, mucus, epithelium from the vagina and uterus, and secretions from the genital glands. Normally it is alkaline in reaction and without coagula, either on account of the admixture of the glandular secretions or from defibrination due to the slowness with which it flows from the uterus. The peculiar odor is due either to long retention of the fluid in the uterus and vagina or to the admixture of the secretions.

Menstruation continues from three to five days in the majority of healthy women, and the quantity of blood discharged is about from two to three ounces, both duration and quantity varying, even in health, according to the *climate*, *diet*, and *surroundings*.

Apart from pregnancy a temporary or premature cessation of menstruation may be caused by exposure to cold, mental impressions or emotions, change of residence and mode of living, or by anæmia and the wasting diseases.

Between the ages of forty and fifty years menstrual life usually terminates, although its cessation may occur earlier or later. This period is called the *menopause*, and may be accompanied by various nervous disorders; as a rule, when menstruation has commenced at an early age, the menopause is later, and *vice versâ.*

Preceding each menstruation there is an increased flow of blood to the pelvic organs, causing a congestion and temporary hypertrophy of some of them.

The ovaries and uterus are specially affected, the latter increases in size about one-fourth, its mucous membrane swells, and the glands pour out an abundant secretion which is finally followed by a flow of blood. The same determination of blood which effects such uterine changes is said to bring about the rapid maturing and rupture of one or more of the ovisacs.

Although ovulation is not strictly periodical, occurring as it sometimes does between the intervals of menstruation or when menstruation is entirely absent, probably it almost always occurs during some part of the menstrual period, or, as some have thought, just preceding its appearance.

Menstruation has been described as a "diminutive of pregnancy," "a periodical abortion," "a sign of disappointed impregnation."

Various causes for this periodical congestion and subsequent discharge of blood have been enumerated; among them are the following: The elimination of poisonous materials from the blood; the removal of superfluous blood which at other times goes to the nourishment of the growing fœtus; reflex irritation from pressure of the growing ovisac upon the ovarian nerves, or, it may be to accustom the female to loss of blood that she may with safety endure the greater loss in labor.

It is thought by some to be the result of glandular function, the menstrual organ being the endometrium; according to this theory impregnation of the ovule may occur at any time, but its retention in the uterus and the establishment of pregnancy will not ensue unless the removal of the epithelium of the mucous membrane has occurred just before its entrance.

An entirely satisfactory cause has not been discovered, nor is it known just when impregnation of the ovule is most likely to occur,—whether before or after the menstrual period; but that the few days immediately following are the most favorable is generally believed.

CHAPTER II.

CONCEPTION.

THE union of the male and female elements of generation (*spermatozoid* and *ovule*).

1. SPERMATOZOID.—The male element, a small body $\frac{1}{500}$ of an inch in length, having an oval head to which is attached a delicate body and tail. They are found in healthy semen in vast numbers, and are formed in the sperm cells which are derived from the *tubuli-seminiferi* of the testicle.

The nuclei of these cells prolifèrate and by their subdivisions form the heads of the spermatozoids, their bodies being made up of the protoplasm of the cells; it is by the decomposition of the substance in which the heads are embedded that they are liberated.

When brought in contact with cold or acid solutions they soon lose their vitality; in the acid secretions of the vagina they remain active but a few hours, but in the uterus or Fallopian tubes where the secretions are alkaline their movements may continue for several days.

The ascension of the spermatozoids is due to their own power of motion, which may be assisted by a sort of sucking movement of the uterus during coition, by peristaltic action of the uterus and Fallopian tubes, by capillary action, or by the movements of the ciliated epithelium.

2. OVULE.—The female element of generation. When the ovisac ruptures the ovule generally escapes from it and rests for a short time upon the surface of the ovary.

If the ovule does not fall into the abdominal cavity it is generally grasped by the fimbriated extremity of the Fallopian tube; some, however, claim that a groove in the upper surface of the tubo-ovarian ligament guides it to the entrance of the tube.

Having entered the tube, it is carried toward the uterus by the motions of the cilia and by the peristaltic action of the tube itself; during this passage, whether impregnation has or has not occurred, the following changes are said to take place :—

(*a*) **An external coating of albumen is formed.** This albuminous coating has been seen upon the ovules of most of the lower animals, and although never observed upon the human ovule, is believed to exist and to form with the *zona pellucida* the *primitive chorion* which contributes to the nourishment of the ovule.

(*b*) **The germinal vesicle moves toward the periphery of the ovule;** there it sends out a process, the *polar globule*, which may subdivide once or twice.

(*c*) **The yelk contracts and becomes more solid;** by its retraction a cavity is formed between the yelk and the zona pellucida—the *respiratory chamber*, which is sometimes filled with a liquid.

If impregnation of the ovule has not occurred no further changes take place, the ovule disintegrates, and is lost in the discharges from the genital canal.

3. IMPREGNATION.—Whether one or a number of spermatozoids gain entrance to the ovule is still a disputed point; by some authorities it is claimed that the entrance of more than one will result in the production of a monstrosity.

The mode of entrance is also unknown; in the ovules of certain fish and of a few of the lower animals minute openings in the zona pellucida have been discovered, but in this respect they seem to differ from the human ovules.

The union of the two elements of generation in the majority of cases occurs either on the surface of the ovary or in the outer portion of the Fallopian tube, and not in the cavity of the uterus (with rare exceptions) as was formerly believed on account of the albuminous coating which, as soon as formed, interferes with the entrance of the spermatozoids.

The entrance having been effected there is at once a fusion of the male and female nuclei; but how this brings about the important changes which follow is still a mystery.

CHAPTER III.

DEVELOPMENT OF THE OVUM.

I. IN THE FALLOPIAN TUBE.—The length of time occupied by the ovum in its passage through the tube is supposed to be ten to twelve days. This fact and the knowledge of most of the changes which occur during this period have been obtained chiefly by studying the process in the lower animals, an opportunity for this study in the human being seldom afforded. The changes which occur in it after impregnation are as follows:—

(*a*) **Formation of the vitelline nucleus.** A clear spot which appears in the centre of the yelk; it is probably the result of the union of the male and female nuclei.

(*b*) **Segmentation of the yelk.** A process of division which commences in the vitelline nucleus almost immediately after its appearance and extends to the yelk causing a division of it into halves; subdivision after subdivision takes place until the yelk has been separated into a number of minute spheres, each of which contains a portion of the vitelline nucleus; this mass, from its supposed resemblance to a mulberry, has been called the "*muriform body.*"

(c) **Formation of the blastoderm.** The cells of the muriform body which, by the formation of a fluid in the centre of the mass are pressed to the surface of the ovum, spread out and flattened beneath the zona pellucida. When the blastodermic membrane, as it is called, is completely formed the ovum has reached the uterus.

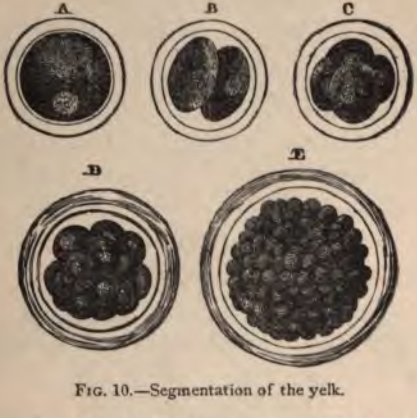

FIG. 10.—Segmentation of the yelk.

2. IN THE UTERUS.—While the ovum is in the Fallopian tube the uterine mucous membrane undergoes various changes for its reception and retention. The changes are similar to those which occur just before each menstruation; the mucous membrane is thickened, softened, and more vascular, but instead of degenerating or undergoing atropy it continues to grow and becomes what is known as the "decidua."

The *decidua* consists of three portions: Decidua vera, decidua serotina, decidua reflexa.

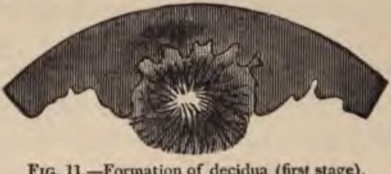

FIG. 11.—Formation of decidua (first stage).

Decidua vera. Originally, all of the changed uterine mucous membrane; after the attachment of the ovum it is that portion which lines the remainder of the cavity.

Decidua serotina. That part of the decidua vera upon which the ovum rests; it afterward enters into the formation of the placenta.

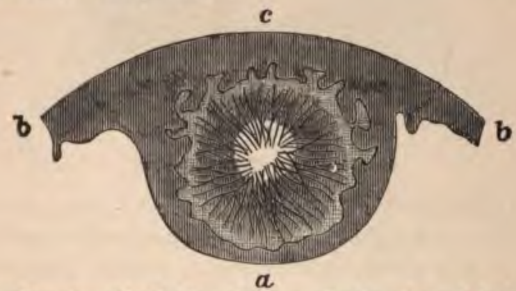

FIG. 12.—Formation of decidua (completed).—*a*, Decidua reflexa; *b*, decidua vera; *c*, decidua serotina.

Decidua reflexa. A growth of the decidua vera around the ovum, covering its free surface. Before the third month of pregnancy the decidua reflexa and decidua vera are not in close apposition, which explains the occasional occurrence of menstruation up to that period. Sometimes this space is filled up with a fluid called "hydroperione."

After the entrance of the ovum its attachment is almost immediately effected, the usual site being the posterior wall of the uterus near the entrance of the Fallopian tube through which it has just passed. Meanwhile, a succession of changes is going on within the ovum as follows:—

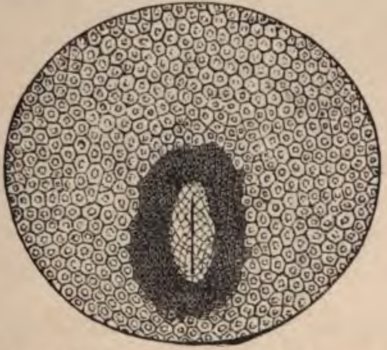

FIG. 13.—Diagram of the area germinativa. In the centre is the primitive trace; immediately surrounding it is the area pellucida, bounded by the dark area vasculosa.

(*a*) **Division of the blastoderm.** At first, into two layers, an external or *epiblast*, and an internal or *hypoblast;* subsequently, between these a third layer is developed—the *mesoblast*, which at a later period undergoes subdivision. From these three layers all the tissues of the fœtus are formed.

From the *epiblast* are developed the epidermis with its appendages, the brain and spinal cord, and the organs of special sense.

From the *mesoblast* are developed the corium, the muscles, bones, connective tissue, blood, bloodvessels, lymphatics, and genito-urinary organs. The mesoblast splits and each of the divisions turns inward, the outer one or *somatopleure* forming the abdominal walls, the inner or *splanchnopleure* the walls of the intestines.

From the *hypoblast* are developed the epithelium of the intestinal canal and its numerous glands, also the epithelium of the respiratory tract.

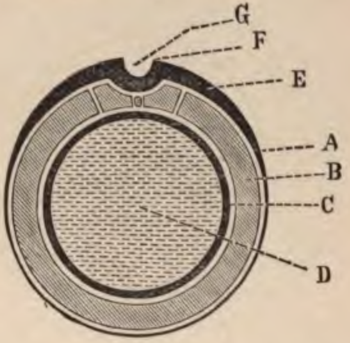

Fig. 14.—Transverse section of ovum in early stage of development (diagrammatic).—A, Epiblast; B, mesoblast; C, hypoblast; D, central portion (fluid); E, area germinativa; F, lamina dorsales; G, primitive trace and medullary groove.

(*b*) **Appearance of the area germinativa,** which is a thickening of the cells of the epiblast; it is oval in shape and has in its centre a collection of more translucent cells, the *area pellucida*. (Fig. 13.)

(*c*) **Appearance of the primitive trace.** A groove in the middle of the area pellucida. The ridges at each side, called *lamina dorsales*, grow upward until they unite posteriorly and form a cavity within which the cerebro-spinal axis is subsequently developed. At the same time processes grow forward and inclose the abdominal cavity. At the sides, in front and behind, folds or thickenings can be detected; the most prominent of these marks the cephalic extremity of the embryo.

(*d*) **Formation of the umbilical vesicle or yelk sac.** A temporary structure made up of most of the contents of the ovum; its purpose is the nourishment of the embryo until other sources have been provided.

By an infolding of the layers of the blastoderm to form the body of the embryo the original vesicle is constricted, and part of it is retained within the abdomen while the larger portion constitutes the umbilical vesicle. Its pedicle, the vitelline duct, contains the omphalomesenteric vessels and passes through an opening which corresponds with the umbilicus.

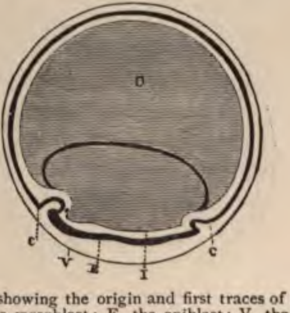

FIG. 15.—A section showing the origin and first traces of the amnion.—O, The umbilical vesicle; I, the mesoblast; E, the epiblast; V, the zona pellucida; CC, origin of the cephalic and caudal amniotic hoods.

(*e*) **Formation of the allantois.** A growth from the abdominal cavity of the embryo; it commences after the twentieth day when the umbilical vesicle is shrinking, and is itself a temporary structure to provide a new source of nourishment.

Being constricted by the abdominal walls a smaller portion of the allantois remains inside and becomes the urinary bladder, its shriveled pedicle forming the urachus, while the larger or outer portion, which contains two arteries and two veins, grows rapidly in the direction of the walls of the ovum over the entire inner surface of which it spreads. One of the veins subsequently disappears.

(*f*) **Formation of the amnion.** The inner of the two fœtal membranes; it consists of two portions, an inner or true amnion, which incloses the fœtus and the liquor amnii and covers the umbilical cord together with the fœtal surface of the placenta, and an outer or false amnion which is spread out on the inner surface of the ovular walls.

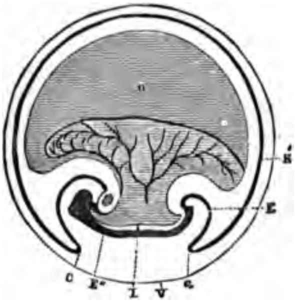

FIG. 16.—The amniotic hoods more developed.—O, The umbilical vesicle; I, the mesoblast; E, epiblast; E', a portion of the epiblast converted into amnion; E'', the embryo; C, limit of amniotic hoods; V, zona pellucida.

The amnion is derived from the epiblast and from the outer division of the mesoblast near the cephalic and caudal extremities; at these points the two folds spring up and grow in the shape of a hollow wall until they have surrounded the embryo and inclosed it within a shut sac—the amniotic cavity, which also contains the liquor amnii.

The *liquor amnii* is an alkaline serous fluid clear at first, but becoming opaque or greenish toward the end of pregnancy; contained as it is within the amniotic cavity it submerges the fœtus, preserves it from shock or injury, facilitates the fœtal movements which assist the development, protects the mother from the inconvenience of the movements, causes the uniform enlargement of the uterus, prevents adhesions between the mother and the fœtus, contributes to the nourishment of the fœtus, and acts as a fluid wedge for dilatation of the os in labor.

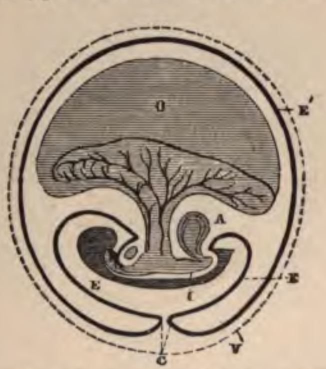

FIG. 17.—The amnion almost completed, also the origin of the allantois.—O, The umbilical vesicle; I, the intestines; E, the amnion; C′, epiblast or non-vascular chorion; V, zona pellucida; C, amniotic hoods ready to close up; A, the allantois.

(*g*) **Formation of the chorion.** The outer of the two fœtal membranes. As has been mentioned, the zona pellucida and its coating of albumen form the *primitive* *chorion;* as soon, however, as the epiblast comes in contact with the inner surface of the zona pellucida the latter is partially absorbed by pressure, and by the union of its remains with the epiblast the *true chorion* is formed. Villi soon project from its surface, and when the allantois has reached the chorion each villus is supplied with a capillary loop which pushes its way to the apex and causes a rapid increase in growth. The villi themselves now give off branches which are supplied in the same manner, subsequently there are branches from these, and so on. (Fig. 20.)

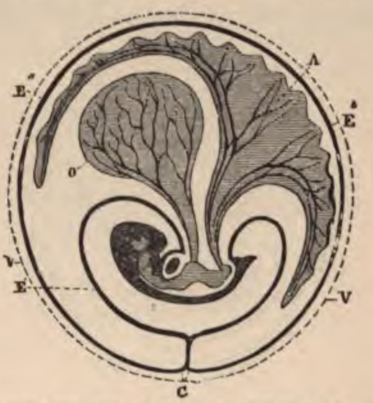

FIG. 18.—The rapid development of the allantois and the disappearing of the umbilical vesicle (the zona pellucida almost atrophied).—O, Umbilical vesicle; E′, amnion; E″, epiblast; C, amniotic hoods coming in contact; V, zona pellucida almost entirely atrophied; A, allantois.

For a short time the villi grow equally over the entire surface of the ovum; but by the end of the second month those which are attached to the decidua serotina grow more rapidly, while those attached to the decidua reflexa begin to atrophy and very shortly have almost disappeared.

Between the chorion and the amnion is a small space which is sometimes filled with a gelatinous fluid called "vitriform body;" this fluid is probably the remains of the allantois, as it is not observed before the appearance of that vesicle. Sometimes the fluid exists in considerable quantity, and should the chorion be ruptured at or near the end of pregnancy it may escape and be mistaken for the amniotic fluid.

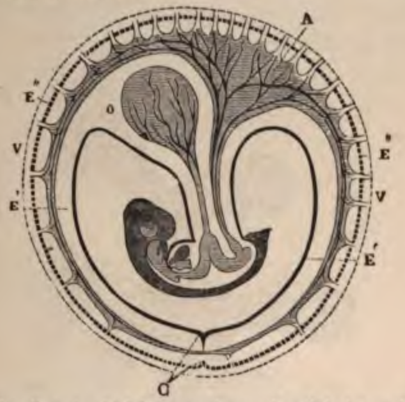

FIG. 19.—The allantois which has spread over the whole internal surface of the ovum sends capillary loops to the villi of the chorion; the amnion incloses the umbilical cord more and more.—O, Umbilical vesicle; E′, amnion; C, amniotic hoods in contact and forming but a single membrane; E″, epiblast; A, allantois; V, zona pellucida.

(*h*) **Formation of the placenta.** The organ of nutrition and respiration for the fœtus; it is a round or slightly oval mass from six to eight inches in diameter, weighs about twenty ounces, and is generally inserted on the posterior wall of the uterus near the fundus and one of the tubes.

It begins to be distinct during the third month, but its formation is not complete until the end of that month; it increases in weight until the seventh month and then undergoes retrograde change. The internal or fœtal surface is smooth and covered by amnion and has attached at or near its centre the umbilical cord. (Fig. 21.)

The external or maternal surface is rough, friable, and furrowed by numerous sulci; it is covered by a delicate membrane which unites the sulci and dips down between them. The openings of the arteries and veins can be seen upon this surface. (Fig. 22.)

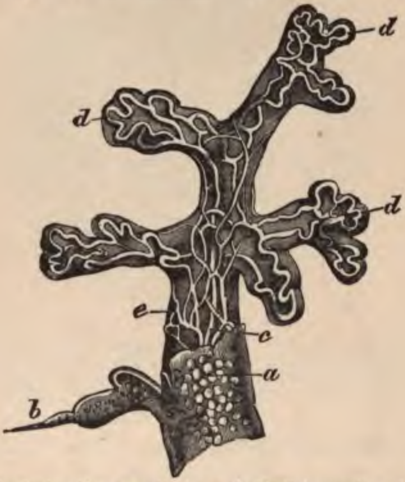

Fig. 20.—Chorionic villus magnified.—*a*, Epithelial covering; *b*, band uniting it to another villus; *c*, main arterial trunk of villus; *d*, terminal vascular loops; *e*, plexus of vessels between artery and vein. (× 350.)

The placenta consists of two portions, an *internal* or *fœtal*, made up of the hypertrophied chorionic villi, and an *external* or *maternal*, made up of the decidua serotina; these two portions are so intimately blended that they form one organ.

The villi of the chorion with their capillary loops are suspended in the greatly enlarged sinuses of the decidua which are filled with blood; so that the blood of the mother does not directly mix with that of the fœtus.

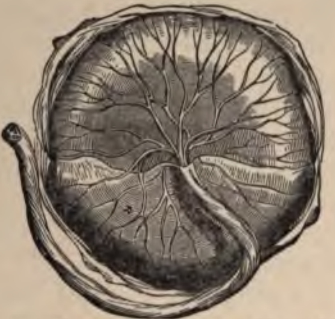

FIG. 21.—The placenta (internal or fœtal surface).

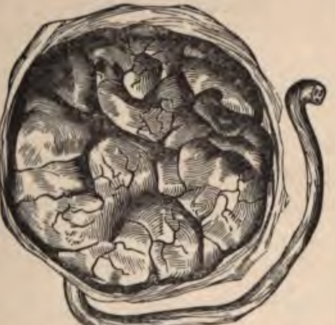

FIG. 22.—The placenta (external or uterine surface).

(*i*) **Formation of the umbilical cord.** The channel of communication between the fœtus and placenta. Its formation commences at the end of the fourth week; at the middle of pregnancy it measures five to eight inches in length and at full term about twenty inches.

It consists of two arteries and one vein, a gelatinous substance called Wharton's jelly, the remains of the allantois, the pedicle of the umbilical vesicle with its vessels, and an external layer from the amnion; it is said to contain a few lymphatics and rudimentary nerves.

The vessels which at first are straight become twisted, the arteries forming spirals around the vein; the arteries enlarge in calibre as they approach the placenta, the only instance of the kind.

The cord is usually attached near the centre of the placenta, but in some instances to the margin, constituting the "battledore" placenta. True knots are sometimes found in the cord.

CHAPTER IV.

FŒTUS.

THE product of conception is called an *embryo* until the third month, or before the formation of the placenta; after that period the term *fœtus* is used.

I. DEVELOPMENT.

(*a*) **First month.** At the end of the second week the embryo is a gelatinous mass about one line in length; at the end of the third week it has doubled in length, is nourished by the umbilical vesicle, the amnion is formed, and the allantois is carrying vessels to the chorion. At the end of the month the length is one-third of an inch, weight about forty grains; the eyes, ears, and rudimentary extremities are distinguishable.

(*b*) **Second month.** Length, one-half to one inch; weight, about one drachm. The umbilical vesicle is becoming smaller, while the villi of the chorion in contact with the decidua serotina increase in number and size.

The head, extremities, eyes, and ears are distinctly visible; the Wolffian bodies begin to atrophy and are replaced by the kidneys; points of ossification appear in the inferior maxilla and clavicle, and the umbilical cord is distinct.

(*c*) **Third month.** Length, two and a half to three inches; weight, seventy grains to one ounce. The umbilical vesicle has disappeared, the chorion has lost most of its villi, and the placenta is formed.

The decidua vera and decidua reflexa come in contact, thus filling the uterine cavity. The fingers and toes are distinguishable, also the sexual organs, but sex cannot be determined.

(*d*) **Fourth month.** At the end of the fourth month the length is about six inches; weight, four ounces. The bones of the skull are partly ossified, hair begins to grow upon the scalp, sex can be determined, and movements of the limbs commence.

A fœtus born at four months may live some hours.

(*e*) **Fifth month.** Length, about ten inches; weight, about ten ounces. A down called *lanugo* covers the entire body, and the *vernix caseosa*, a greasy unctuous substance composed of epithelium and sebaceous secretion, begins to form upon the surface. The fœtal movements are perceptible to the mother.

(*f*) **Sixth month.** Length, about twelve inches; weight, a little more than one pound. Fat is deposited under the skin and the eyelids are closed.

A fœtus born at six months breathes feebly, but generally dies in a few hours.

(*g*) **Seventh month.** Length, thirteen to fifteen inches; weight, three to four pounds. The eyelids are open and the testicles are near the scrotum.

At the end of the seventh month the fœtus is said to be "viable," but the majority of children born at this period die.

(*h*) **Eighth month.** Length, sixteen to eighteen inches; weight, four to five pounds. The membrana pupillaris has disappeared, the lanugo begins to disappear, and the insertion of the umbilical cord is near the middle of the body.

(*i*) **Ninth month** (*full term*). Average length, twenty inches; average weight, six and a half to eight pounds. Male children at birth exceed females both in size and in weight.

2. FŒTAL HEAD.—At the time of birth the bones of the cranium are not completely ossified nor firmly united, cartilage being interposed and permitting alteration of shape and position during labor.

The membranous septa between the bones are called *sutures*, while the points at which the sutures meet are called *fontanelles.*

There are four principal sutures:—

(*a*) **Sagittal,** which separates the two parietal bones.

(*b*) **Frontal.** A continuation forward of the sagittal suture dividing the frontal bone into halves.

(*c*) **Coronal.** Separating the frontal from the parietal bones.

(*d*) **Lambdoidal.** Separating the occipital from the parietal bones.

There are two fontanelles:—

(*a*) **Anterior,** called *bregma* (*moisture*). Formed by the junction of the sagittal, frontal, and coronal sutures; it is quadrangular in shape, and the larger of the two.

(*b*) **Posterior.** Formed by the junction of the sagittal and lambdoidal sutures; it is triangular in shape.

The fontanelles are distinguishable to the touch by tracing *four* lines from the anterior and *three* from the posterior.

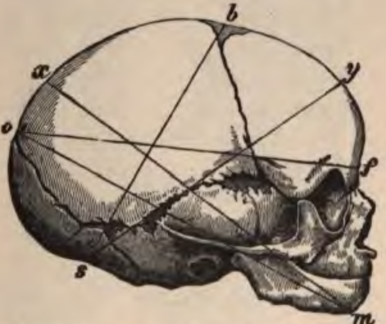

FIG. 23.—The fœtal skull (diameters).—*of*, Occipito-frontal; *om*, occipito-mental; *sb*, sub-occipito bregmatic.

The *diameters* of the fœtal head are as follows (Playfair):—

Occipito-mental	5.25 to 5.50	inches.
Occipito-frontal	4.50 to 5	"
Sub-occipito bregmatic	3.25	"
Cervico-bregmatic	3.75	"
Bi-parietal	3.75 to 4	"
Bi-temporal	3.50	"
Fronto-mental	3.25	"

In the majority of the cases of normal labor it is the *sub-occipito bregmatic* diameter of the fœtal head that is engaged in the pelvis. The fœtus undergoes many changes of position in the uterus, but at the termination of pregnancy in 96 per cent. of all cases the head is the presenting part.

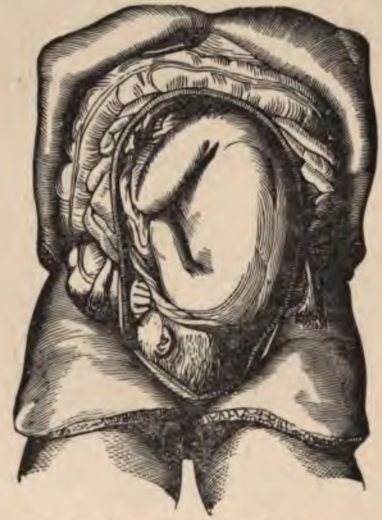

FIG. 24.—The usual position of the fœtus.

3. FŒTAL CIRCULATION.—The purified blood returned from the placenta through the umbilical vein enters the fœtus at the umbilicus and passes to the under surface of the liver, where a portion of it is distributed, the greater part passing directly through the *ductus venosus* into the ascending vena cava, where it mixes with the blood from the trunk and lower extremities and finally enters the right auricle of the heart.

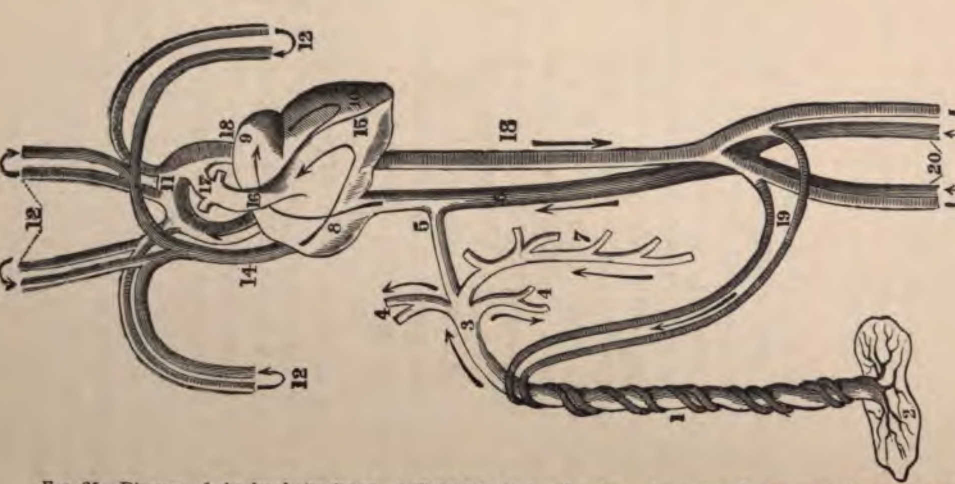

FIG. 25.—Diagram of the fœtal circulation.—1, Umbilical cord with veins and arteries; 2, placenta; 3, divisions of umbilical vein; 4, branches to the liver; 5, ductus venosus; 6, inferior vena cava; 7, portal vein; 8, right auricle; 9, left auricle; 10, left ventricle; 11, arch of aorta; 12, blood returned from upper portion of body; 14, superior vena cava; 15, right ventricle; 16, pulmonary artery; 17, ductus arteriosus; 18, descending aorta; 19, umbilical arteries; 20, external iliac vessels.

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Guided by the *Eustachian valve* the blood passes through the *foramen ovale* into the left auricle and thence to the left ventricle; from the left ventricle it goes through the aorta, chiefly to the head and upper extremities. Returning through the descending vena cava it is carried through the right auricle, in front of the Eustachian valve, into the right ventricle; thence it passes into the pulmonary artery through which a small portion goes to the lungs, but the greater part is carried through the *ductus arteriosus* into the aorta (descending) and distributed to the lower extremities and to the placenta.

The liver receives the purest blood; the head and upper extremities receive a richer and purer blood supply than the lower extremities, which accounts for their greater development.

At birth when respiration is established the blood supply to the lungs is increased, and the ductus arteriosus being no longer used is obliterated in a few days.

The blood coming from the lungs fills the left auricle and prevents that which enters the right auricle passing through the foramen ovale; so that this opening in a few days is entirely closed. Closure of the umbilical arteries and vein and of the ductus venosus occurs shortly after the blood has ceased flowing through them.

CHAPTER V.

MATERNAL CHANGES.

I. IN THE PELVIS.—The joints are swollen, softened, and more movable.

The general pelvic hyperæmia occurring at each menstrual period continues after impregnation, and on account of increased nutrition causes a marked growth of the uterus and its appendages, the mucous membrane, muscular walls, peritoneal covering, arteries, veins, nerves, and lymphatics being included in this change.

The growth of the mucous membrane and formation of the deciduæ have been described.

The growth of the muscular wall is more marked before the fourth month, and until that period it progresses about as rapidly in extra-uterine as in intra-uterine pregnacy; in the later months when its contents are undergoing more rapid development the uterine walls no longer increase in thickness, but by distension are somewhat thinned.

The increased weight of the organ itself causes a sinking in the pelvis during the first months of gestation; this condition is usually attended by pelvic pains or dragging sensations.

During the first months the development of the uterus is greater in the lateral than in the longitudinal direction.

About the middle of the *third* month or the commencement of the *fourth* the fundus rises above the brim of the pelvis; after this period (sixteenth to eighteenth week) the mother detects the fœtal movements, when "quickening" is said to have taken place.

At the commencement of the *sixth* month the fundus has reached the level of the umbilicus; during the *seventh* it is two inches above, and at *full term* is close to the edges of the ribs.

A week or more before delivery, on account of relaxation of the soft parts, the mass sinks somewhat into the pelvis, causing the patient to feel more comfortable as far as respiration is concerned.

The *uterus* is usually inclined to the right side; this is due either to congenital tendency, gravity—sleeping on the right side, or to pressure of a distended rectum or sigmoid flexure. The growth of the uterus does not materially affect the cervix; there is, however, a marked softening and an apparent shortening; real softening of the cervix does not occur until within a few days or even hours before labor commences.

The *cervical canal* is filled with a plug of mucus.

The *vagina* has a purple or violet hue due to the venous congestion, and on account of its greater blood supply the *vaginal pulse* may be felt. Its secretions and those of the vulva are increased.

2. IN THE BREASTS.—Changes may occur shortly after conception, but it is usually the second month when the breasts begin to enlarge, become tender, and are the seat of darting pains and sensations. The areola becomes more pigmented, and the sebaceous follicles—tubercles of Montgomery—are more prominent upon its surface. During the later months a secondary areola, lighter in color, surrounds the primary. The superficial veins enlarge, and milk is usually present.

3. IN THE SKIN.—Beside the changes in the areolæ of the breasts there is a tendency to pigmentation of the abdomen, face, and forehead.

4. IN THE DIGESTIVE SYSTEM.—The appetite is often capricious or depraved. Gastric disturbance—probably reflex—is common before the fourth month; it is manifested by nausea, and perhaps vomiting, which is usually limited to the early part of the day, and known as "morning sickness." There may be diarrhœa, but constipation is the rule. Profuse salivation sometimes but rarely occurs.

5. IN THE NERVOUS SYSTEM.—The nervous sensibility is increased; hysterical disorders, disturbance of the special senses, neuralgic affections, morbid cravings, changes in disposition and character are very common.

6. IN THE CIRCULATION.—The quantity of the blood is increased; it contains more water, less albumen, fewer red corpuscles, a slight increase in the number of the white, and during the later months of pregnancy a greater amount of fibrin. A temporary hypertrophy of the heart, particularly of the left ventricle, is said to be a constant occurrence.

7. IN THE RESPIRATORY ORGANS.—As pregnancy advances the quantity of carbonic acid given off by the lungs is increased. On account of compression of the thorax embarrassed respiration may result.

8. IN THE CRANIUM.—In pregnant women a bony formation called "osteophyte" is frequently found on the internal table of the cranial bones between the bone and dura mater; similar deposits have been found on the inner surfaces of the pelvic bones; they have also been noticed within the skulls of tuberculous subjects.

9. IN THE URINE.—There is a larger quantity secreted on account of the increased arterial tension.

In the latter months compression of the renal vessels causes congestion, and albuminuria may result; in a small proportion of cases sugar is present in the latter months. The urine of pregnant women which has been allowed to stand thirty-six hours or more has formed upon its surface a scum called "*kyestine*," which in a few days breaks up and falls to the bottom of the vessel. This deposit consists of fat, phosphatic crystals, and bacteria, but having been found in the urine of the non-pregnant is no longer considered diagnostic of pregnancy.

PART III.

PREGNANCY.

CHAPTER I.

DIAGNOSIS OF PREGNANCY.

THE signs of pregnancy have been classified as *presumptive*, *probable*, and *certain*; the following classification includes all of them: *Symptomatic signs; physical signs.*

I. SYMPTOMATIC SIGNS.—The symptomatic signs of pregnancy are: *Cessation of menstruation; morning sickness; nervous disorders; pelvic disorders; quickening.*

(*a*) **Cessation of menstruation.** A sign of pregnancy when the menses have previously been regular; in exceptional cases menstruation continues throughout pregnancy; it commonly is regular until the *third* month, or before the deciduæ meet and fill the uterine cavity. During lactation it is normally absent, and exposure to cold, mental emotions, and debility may cause a suppression.

(*b*) **Morning sickness.** A sign of pregnancy which is rarely absent; it may commence immediately after conception and continue until delivery, but is most common during the early months.

(*c*) **Nervous disorders.** These signs have been enumerated; without the presence of others they are unreliable.

(*d*) **Pelvic disorders.** Irritability of the bladder, pelvic pains and dragging sensations caused by the increased weight and consequent slight prolapse of the uterus.

(*e*) **Quickening.** The sensation felt by the mother about the sixteenth or eighteenth week of pregnancy; it is produced by the movements of the fœtus, which before were not perceptible.

2. PHYSICAL SIGNS.—The physical signs of pregnancy are: *Mammary changes; pigmentary changes; enlargement of the uterus and abdomen; cervical and vaginal changes; ballottement; intermittent uterine contractions; fœtal movements; fœtal heart sounds; uterine souffle; umbilical souffle.*

(*a*) **Mammary changes.** These have been described; in primiparæ they are more valuable than in multiparæ, but in no instance should they be regarded as infallible signs.

(*b*) **Pigmentary changes.** The dark band extending along the linea alba from the ensiform cartilage to the pubes and the other changes, which have been mentioned, are of some value as signs of pregnancy.

(*c*) **Enlargement of the uterus and abdomen.** Gradual and uniform enlargement suggests pregnancy, especially if associated with other signs. During the latter months pouting of the umbilicus is an additional characteristic condition.

Excessive deposit of adipose tissue, ascites, chronic metritis, retained menstrual fluid or abdominal and pelvic tumors may cause the enlargement.

(*d*) **Cervical and vaginal changes.** Softening and apparent shortening of the cervix, increased secretion, vaginal pulsation, and violet coloration of the cervix, vagina, and vulva. All of these changes except the first may be caused by any pressure from above.

(*e*) **Ballottement.** The sensation of a rebound imparted to the finger after it has caused a momentary displacement of the fœtus in the liquor amnii; the tip of the finger should be placed just in front of the cervix. Ballottement is most successfully practiced between the *fourth* and *seventh* months. *External ballottement* is practiced by pressing the uterine contents with the two hands laid upon the abdominal wall and causing the fœtus to float between them.

(*f*) **Intermittent uterine contractions.** The alternate contractions and relaxations obtained by placing the hands over the uterine tumor upon which moderately firm pressure is being made; as a sign of pregnancy it is not altogether reliable.

(*g*) **Fœtal movements.** When these can be felt by the examining hand they are a reliable sign of pregnancy.

(*h*) **Fœtal heart sounds.** The most reliable of all the signs of pregnancy; they are usually heard in the fifth month, but may be detected earlier. In the latter months in head presentations the sounds are heard below the umbilicus, the usual site being midway between the umbilicus and the left anterior superior spinous process of the ileum; in presentations of the pelvis they are heard above the umbilicus. The pulsations vary from 120 to 160 a minute, and are said to be slower in male and more rapid in female fœtuses.

(*i*) **Uterine souffle.** A blowing murmur synchronous with the maternal pulse; its origin is in the large arteries of the uterine wall. This sound may be heard as early as the fourth month.

(*j*) **Umbilical souffle.** A hissing sound synchronous with the fœtal heart; it is supposed to originate in the umbilical cord, is rarely heard, and is of no practical value. A rustling sound is described as occurring when the fœtus is dead.

3. DIFFERENTIAL DIAGNOSIS.—The conditions and diseases for which pregnancy may be mistaken, and *vice versâ*, are as follows: *Adipose enlargement of the abdomen* and *deposit of fat in the omentum; ascites; retained menses; congestive hypertrophy; uterine tumor; ovarian tumor; spurious pregnancy.*

(*a*) **Adipose enlargement of the abdomen** and deposit of fat in the omentum when associated with irregular menstruation may obscure the diagnosis by preventing the detection of the uterus. The presence of fat in other portions of the body and absence of the other signs are the indications of a non-pregnant condition.

(*b*) **Ascites.** The history, the uniform distension, the fluctuation, the change of shape and of the percussion note when the position is altered, and the absence of the signs of pregnancy make the diagnosis almost certain.

(*c*) **Hæmetometra** (*retained menses*). The history, the periodical enlargement and distress, the long duration and absence of most of the signs of pregnancy distinguish it from that condition.

(*d*) **Congestive hypertrophy.** The history, the pain, the tenderness on pressure, absence of further development and of most of the signs of pregnancy should make the diagnosis almost certain.

(*e*) **Uterine tumor** (*fibroid*). Regular or excessive menstruation, the hard, irregular, and inelastic enlargement, the history and the absence of most of the signs f pregnancy will aid in the diagnosis.

(*f*) **Ovarian tumor** (*cystic*). The generally regular menstruation, the fluctuation, the unilateral enlargement usually of slower progress than pregnancy, the history, the emaciation and general ill health, and the absence of most of the signs of pregnancy make the diagnosis easy.

(*g*) **Spurious pregnancy,** which usually occurs in hysterical subjects, may be accompanied by many of the signs of pregnancy. The absence of most of the physical signs and the administration of an anæsthetic should enable one to make a differential diagnosis.

CHAPTER II.

DURATION OF PREGNANCY.

THE exact duration of pregnancy is still an uncertainty; an error of twenty-five days, the length of time between the end of one menstruation and the commencement of the next, is always possible.

Counting from the cessation of the last menstruation to delivery, the average number of days is 278.

Numerous instances of protracted gestation are on record.

Various methods of predicting the date of confinement have been employed, among them are the following:—

Naegele's Method. Count *seven days* from the first appearance of the last menstrual period, and then reckon backward three months.

Duncan's Method. Find the day on which the female ceased to menstruate, or the first day of being what she calls "well." Take that day nine months forward as 275, unless February is included, in which case it is taken as 273 days. To this add three days in the former case, or five if February is in the count, to make up the 278. This 278th day should then be fixed on as the middle of the week, or, to make the prediction the more accurate, of the fortnight in which the confinement is likely to occur, by which means allowance is made for the average of either excess or deficiency.

As *quickening* usually occurs shortly after the sixteenth week, the probable duration from that period can be calculated.

CHAPTER III.

ABNORMAL PREGNANCY.

I. MULTIPLE PREGNANCY.—Twin births occur once in 87 labors; triplets once in 7679. Cases are on record where four and five children have been given birth at one time.

Multiple pregnancies are due either to the simultaneous rupture of two or more ovisacs, to two or more ovules being contained within one ovisac, or to one ovule containing a double germ.

The children are nearly always smaller in size and less perfectly developed than in single births.

Abortions and monstrosities are more frequent in plural than in single pregnancies, while the triple and quadruple rarely, if ever, go to full term.

In the case of twins the membranes and placenta are usually separate; in rare cases both fœtuses are contained in a common amniotic sac.

In the case of triplets the membranes and placenta may be separate, but commonly there is one complete bag of membranes, and a second having a common chorion with a double amnion.

The diagnosis of multiple pregnancy is difficult and generally uncertain before the birth of the first child.

Superfecundation is the impregnation of one or more ovules after one has been impregnated and before the decidua lining the uterus has been formed.

Superfœtation is the impregnation of a second ovule when the uterus already contains one which is undergoing development.

2. EXTRA-UTERINE PREGNANCY.—The varieties of extra-uterine pregnancy are *tubal*; *abdominal*; and *ovarian*.

(*a*) **Tubal pregnancy** may be caused by anything which diminishes the calibre of the tube, and is probably due in many cases to inflammatory thickening of the coats of the tube which interferes with the progress of the ovum on its way to the uterus. Fright and shock are given as causes; also, the accidental loss of the tubal epithelium, which it is claimed generally remains intact during menstruation. Tubal pregnancy usually terminates in rupture of the tube before the twelfth week; a few cases, it is claimed, have gone to full term.

(*b*) **Abdominal pregnancy** may result from the falling of an impregnated ovule into the abdominal cavity where it becomes attached and develops, or from the rupture of a tubal pregnancy.

(*c*) **Ovarian pregnancy,** a very rare occurrence, is caused either by the penetration of the ovisac by a spermatozoid, or by the impregnation of an ovule which has failed to escape from the ovisac after the latter has ruptured.

CHAPTER IV.

DISORDERS OF PREGNANCY.

THE disorders which are liable to accompany the pregnant condition are as follows:—

Of the digestive system; of the blood and circulatory system; of the genito-urinary system; of the nervous system; displacements of the uterus.

I. OF THE DIGESTIVE SYSTEM.—The disorders of the digestive system are:—

Nausea and vomiting, diarrhœa, constipation, hemorrhoids, salivation.

(*a*) **Nausea and vomiting,** called "morning sickness," are common in the early months before quickening; when that period has arrived there is usually a cessation of the distress; but it may continue throughout pregnancy or become so serious as to endanger the mother's life unless abortion occur or be induced.

These disorders are probably reflex in origin, and are caused by diseased conditions of the cervix, displacements of the uterus, or probably in most cases, by stretching of the uterine tissues; on the latter account they are more marked in frequency and severity in first pregnancies.

Treatment.—Regulation of diet; regulation of bowels; correction of the acid gastric secretion with alkalies; light breakfast in bed; correction of uterine displacements and diseases; general hygienic surroundings. These measures failing, the following drugs are useful: Bromide of sodium, oxalate of cerium, tincture of nux vomica, hydrocyanic acid (dilute), morphia, calomel, bismuth, carbolic acid, creasote, ipecac, pepsin, etc.

When every remedy has failed, and the patient's life is in danger, the induction of abortion is justifiable.

(*b*) **Diarrhœa,** which occasionally occurs, is due to error of diet or is of nervous origin.

Treatment.—Regulation of diet, astringents, etc., and remedies as indicated.

(*c*) **Constipation** is a more common disorder, and results from interference with the intestinal movements by pressure of the gravid uterus, and atony of the intestines caused by pressure and an altered state of the blood.

Treatment.—Regulation of diet, mild laxatives, nervines, general tonics. All irritating or drastic cathartics should be avoided. Toward the end of pregnancy enemata and other mechanical means are sometimes necessary to remove an impaction of the rectum.

(*d*) **Hemorrhoids** are of two varieties: external or venous; internal or arterial.

Treatment.—Regulation of bowels; for the external variety,—the knife; for the internal,—an immediate reduction of the protrusion followed by hot and sedative applications.

(*e*) **Salivation,** though of rare occurrence, is sometimes profuse. It is probably due to a deficiency of alkaline matter in the blood and secretions.

Treatment.—The administration of alkalies and the use of astringent mouth washes.

2. OF THE BLOOD AND CIRCULATORY SYSTEM.—The disorders of the blood and circulatory system are: *Anæmia; hydræmia; varices; œdema.*

(*a*) **Anæmia** is normally present; sometimes it requires tonics, iron, and a liberal diet.

(*b*) **Hydræmia,** a general œdema caused by an increase in the watery portion of the blood. The dropsy may occur in the lower extremities only, but sometimes extends to the vulva, face, and upper portions of the body, and may result in death of the fœtus, miscarriage, or premature labor.

Treatment.—Tonics, laxatives, diuretics, rest, symptomatic treatment.

(*c*) **Varicose veins** are of frequent occurrence, being the result of pressure and increased blood supply. They occur most frequently from the second to the fifth months, and are found in the lower extremities (ext. saphenous veins), and in the vulva.

Treatment.—Regulation of bowels, rest, elevation, removal of pressure, compression by bandage or elastic stocking.

(*d*) **Œdema** of the legs is a result of hydræmia, of pressure, or of varicose veins; the œdema often extends to the vulva.

Treatment.—Regulation of bowels, rest and elevation, removal of pressure, compression, diuretics, and diaphoretics.

3. OF THE GENITO-URINARY SYSTEM.—The disorders of the genito-urinary system are: *Albuminuria; diabetes; irritability of the bladder; leucorrhœa; pruritus vulvæ.*

(*a*) **Albuminuria.** The presence of albumen in the urine of pregnant women is a common occurrence; according to some authors it is found in twenty per cent. of all cases; others make the percentage much smaller. In the majority of cases it is a temporary disturbance, disappearing after delivery and causing no unfavorable results. It occurs most frequently in first and twin pregnancies, and comes on during the latter months.

The causes are, previous presence of albumen, pressure of the gravid uterus upon the renal veins causing congestion and changes in the kidney substance, increased work of the kidneys, increased arterial tension, and reflex irritation arising from the uterus.

Albuminuria may induce abortion or cause death of the fœtus; when the urinary secretion is lessened in amount or when there is retention of its elements in the blood, *eclampsia* may result.

Treatment.—If the quantity of albumen is small and not accompanied by marked symptoms, no active treatment will be required. The diet should be regulated and all pressure removed; a temporary removal of pressure from the renal vessels can be accomplished by causing the patient to assume occasionally the knee-chest position or such position as will allow the abdomen to be suspended over the side of a bed or sofa. If the albumen increases and œdema follows, active treatment should be commenced at once.

The following remedies are useful: occasional saline cathartics, diuretics such as acetate or bitartrate of potassium and digitalis, diaphoretics, tonics such as iron, counter-irritation. When there is threatened or partial suppression of urine, colchicum should be used.

As a last resort, when the mother's life is in danger, abortion or premature labor may be induced.

(*b*) **Diabetes** renders conception unlikely, but when such does occur death of the fœtus is liable to follow. The results to the mother are frequently serious. Glycosuria sometimes comes on in the latter months of pregnancy.

(*c*) **Irritability of the bladder** and incontinence of urine are often produced by displacements of the uterus, especially anteversion and anteflexion.

Treatment.—Replacement and support of the uterus.

(*d*) **Leucorrhœa** is generally due to a congestion of the vaginal mucous membrane; it is more annoying in the latter half of pregnancy, and although it generally does not entirely disappear until after delivery, the distress which it occasions may be greatly relieved.

Treatment.—Removal of pressure, cleanliness, vaginal douches (carbolic acid, boracic acid, chlorate of potassium, chloride of sodium, alum, borax, zinc), medicated tampons.

(*e*) **Pruritus vulvæ** is of frequent occurrence, and may be very annoying; it is a result of leucorrhœa, varicose veins, or œdema of the vulva.

Treatment.—Removal of pressure, treatment of the leucorrhœa, sedative applications; in obstinate cases nitrate of silver or corrosive sublimate locally applied. Bromide of potassium is useful to allay the nervous irritability.

4. OF THE NERVOUS SYSTEM.—The disorders of the nervous system are: *Sleeplessness; neuralgiæ; paralyses; chorea; affections of the respiratory organs; affections of the circulatory organs.*

(*a*) **Sleeplessness** requires hygienic surroundings and use of the bromides.

(*b*) **Neuralgiæ** of the face, mammæ, and uterus are common.

Treatment.—Attention to the health and teeth; quinia, morphia, iron, sedative applications.

(*c*) **Paralyses** of pregnancy are generally either hysterical or uræmic in origin.

(*d*) **Chorea** may make its first appearance during pregnancy, but most frequently is a recurrence; it is sometimes fatal to both mother and fœtus.

Treatment.—As in the non-pregnant condition the use of arsenic, the bromides, and iron. The induction of premature labor may be necessary.

(*e*) **Affections of the respiratory organs,** including spasmodic cough and dyspnœa, are common disorders and may be very troublesome.

(*f*) **Affections of the circulatory organs,** including palpitation and syncope, generally depend on the anæmic condition of the blood, but may be due to pressure of the gravid uterus on the diaphragm.

5. DISPLACEMENTS, OF THE UTERUS.—The displacements of the uterus are: *Prolapse* or *procidentia; anteversion* or *anteflexion; retroversion* or *retroflexion.*

(*a*) **Prolapse** of slight degree usually exists during the first three months of gestation. When prolapse or procidentia have existed before conception abortion usually results. At the fourth month the uterus begins to ascend and soon rises above the brim of the pelvis.

(*b*) **Anteversion or anteflexion** in the early months may cause irritability of the bladder. In the latter months they sometimes cause separation of the recti muscles and produce the *pendulous abdomen.*

(*c*) **Retroversion or retroflexion.** Pregnancy rarely occurs in a retroverted uterus, so that this condition if present is generally an accident coming on after pregnancy has commenced. Retroflexion does not interfere with conception, but abortion is liable to follow.

These displacements are the results of previous uterine disease, falls, distended bladder or pressure from above (corsets, etc.). If abortion does not occur, the displacement is in the majority of cases corrected by the uterus rising out of the pelvis after the third month. There are on record a few cases in which the retroflexion continued until full term, one of Oldham's* in which he delivered a dead child, another occurring more recently in the practice of Prof. William S. Stewart,† of Philadelphia, in which a living child was delivered.

CHAPTER V.

DISEASES OF PREGNANCY.

THE diseases and accidents liable to complicate pregnancy are as follows: *Intercurrent diseases; pathological conditions of the decidua, ovum, and fœtus; abortion, miscarriage, and premature labor.*

I. INTERCURRENT DISEASES.—The pregnant woman is liable to all diseases acute or chronic; the influences of these upon the mother and fœtus vary greatly.

(*a*) **Continued fevers** (*typhoid*, *typhus*, *relapsing*), usually induce abortion.

(*b*) **Eruptive fevers** (*smallpox*, *scarlet fever*, *measles*), may cause abortion; the first is a grave complication, but the latter, unless severe, are of little consequence as far as the mother's life is concerned.

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* London Obstetrical Society's Transactions, vol. i.

† "The importance of careful diagnosis of pregnancy, with the history of a case of retroflexion going to full term." Read before the Obstetrical Section of the Ninth International Medical Congress, held in Washington, D.C., September, 1887.

This case had previously been diagnosed by several physicians "uterine fibroid," and a day fixed for an operation for its removal. The patient coming under the notice of Professor Stewart the retroflexion was discovered when it was too late for replacement with safety to the fœtus.

(*c*) **Pulmonary diseases.** *Acute pneumonia* is usually fatal to mother and fœtus.

Phthisis is usually a preventive of pregnancy, but pregnancy does not, as is generally supposed, retard the progress of the disease; on the other hand, it is said to favor its development when there is an hereditary tendency.

(*d*) **Cardiac disease,** whether previously existent or coming on during pregnancy, is a grave complication, the distress and danger being more marked in the latter months.

(*e*) **Syphilis,** although liable to induce abortion or premature labor, is without immediate danger as far as the mother's life is concerned.

It is during the secondary stage of the disease that abortion is most likely to occur, the syphilitic woman who becomes pregnant being more liable to abort than one who is pregnant and contracts syphilis; if the inoculation has occurred after the fourth month the danger to the fœtus is slight.

(*f*) **Jaundice.** Simple jaundice is quite common during the latter months of pregnancy.

The malignant variety may occur earlier in pregnancy, and depends upon structural disease of the liver which is accompanied by acute yellow atrophy; it results in almost certain death.

(*g*) **Carcinoma uteri,** in the early period of the disease, does not prevent conception. The growth may become great enough to interfere with natural delivery, but this is not a common occurrence.

2. PATHOLOGY OF THE DECIDUA, OVUM, AND FŒTUS:—

(*a*) **Endometritis.** Inflammation of the uterine mucous membrane may be acute or chronic; the former variety, which is caused by acute febrile diseases, is characterized by hemorrhage and usually followed by abortion; the chronic form is usually the result of an endometritis existing previous to pregnancy, and although it does not always induce abortion the liability is increased.

The decidua is usually much thickened, its internal surface may be studded with polypoid growths, and there is generally a process of fatty degeneration going on.

(*b*) **Hydrorrhœa gravidarum.** An intermittent discharge of a watery fluid from the pregnant uterus; the fluid, which collects between the chorion and the decidua, is probably the result of a catarrhal endometritis; it occurs most commonly in multigravidæ, commencing about the third month of pregnancy.

(*c*) **Hydatidiform degeneration of the chorion,** or *vesicular mole.* A disease of the chorial villi, the result of death of the embryo and transference of the developmental energy to the villi of the chorion, or of maternal disorders, such as endometritis, syphilis, etc. The growth of the mole is rapid, and in a short space of time the enlargement may be very great; at about the third month profuse watery and bloody discharges make their appearance, and portions of the cysts may come away. As soon as it is recognized the entire mass should be removed, otherwise, it may remain in the uterus for months or years.

(*d*) **Diseases of the placenta.** Inflammation, atrophy, fatty degeneration, hemorrhage, œdema.

The possibility of the occurrence of inflammation of the placenta, although it has been denied by some, is now generally believed; the usual result of such inflammation is atrophy of the placenta followed by death of the fœtus. Fatty degeneration is a result of death of the fœtus or of maternal disorders which interfere with its nutrition (syphilis, etc.). The degeneration may be partial or complete; if it is at all extensive abortion will follow.

Hemorrhage is usually the result of inflammation; it rarely occurs, but if the effusions are large the pressure which they cause may interfere with the nutrition of the fœtus.

Œdema may be due to maternal or fœtal disorders; among the former may be mentioned general œdema of albuminuria, ascites from hepatic obstruction, etc.; among the latter, excessive secretion of amniotic liquor, obstruction of the fœtal circulation.

(*e*) **Hydramnion** or **polyhydramnios.** An excessive secretion of amniotic liquor (more than two quarts). Various causes for this have been assigned, such as inflammation of the amnion, morbid conditions of the decidua, disturbance of the maternal or fœtal circulation. It occurs once in about 150 pregnancies; usually it does not commence before the fifth or sixth month, but very soon causes marked distension of the abdomen and an exaggeration of the ordinary discomforts. The prognosis for the fœtus is unfavorable.

(*f*) **Diseases of the fœtus.** Of those transmitted from the parent *syphilis* is most common and at the same time most fatal. Fœtal syphilis may be transmitted from the father alone, from the mother alone or from both parents; and the mother may become affected through the embryo.

If the mother be inoculated at or near the time of conception the infection of the fœtus is almost certain; if, however, she contract the disease at an advanced period of pregnancy (after the sixth month) the fœtus may escape.

When either or both parents are syphilitic, abortions are the rule, each product of conception being lost at a later period, until finally one may be alive at birth. A syphilitic child, if born alive, is small, poorly developed, has a hoarse cry and the well-known snuffles, and is covered with a characteristic eruption (usually pemphigus), which is more marked upon the hands and feet.

Intra-uterine amputations are due to constrictions by amniotic bands or by coils of the umbilical cord.

(*g*) **Death of the fœtus.** After its death the fœtus is usually expelled from the uterus in two to fifteen days; if it is a twin pregnancy and one fœtus dies, both are commonly retained until the living one has matured; even in single pregnancies the dead fœtus may be retained a considerable time and undergo various changes.

In the early months it may liquefy and leave no trace of its existence; or degeneration of the chorial villi may occur and result in a "mole pregnancy" (*vesicular mole*) which may be retained within the uterus for some weeks, giving rise to attacks of pain and hemorrhage until it is expelled; when there has been an extensive extravasation of blood beneath the decidua so that the latter is torn through and clots have formed between it and the chorion or even in the cavity of the amnion, the ovum may be retained for a considerable time, during which the coagulated fibrin, membranes, and placenta undergo secondary changes which lead to the formation of another variety of "mole pregnancy" (*fleshy mole*); these fleshy moles are often retained for many weeks after death of the embryo or fœtus, and give rise to the attacks of pain and hemorrhage which have been mentioned above.

Mummification may occur in a fœtus of three or four months if the membranes have not been ruptured.

(*h*) **Missed labor.** A term applied to those cases in which a dead fœtus is retained in the uterus beyond the period when pregnancy ordinarily terminates.

3. ABORTION, MISCARRIAGE, AND PREMATURE LABOR.—By abortion is meant the expulsion of the ovum during the first three months of pregnancy, or before the formation of the placenta; by miscarriage, the expulsion of the fœtus between the fourth and seventh months, or before the period of viability; by premature labor, the expulsion of the fœtus between the seventh and ninth months, or between the periods of viability and full term of gestation.

The terms *abortion* and *miscarriage* are used, as a rule, without regard to the distinction just made.

Abortions are most common in multiparæ (twenty-three to three). About ninety per cent. of married women who live to the menopause have aborted. The relative frequency of abortions and deliveries at full term is, according to some, one to eight or ten; according to others, one to five.

Women who have aborted once are more liable to a recurrence, either on account of the existence of the original cause or from an irritable or diseased condition of the uterus thus acquired. Abortions most frequently occur during the first three months at times corresponding with the menstrual flow, and particularly toward the end of the third month when the placental circulation is being established. Before this period the ovum generally comes away entire, and on this account may cause but slight disturbance. Later the placental adhesions are firm and are sometimes separated with difficulty, causing risks of hemorrhage and septicæmia.

(*a*) **Causes.** These may be classified as paternal, maternal, and ovular.

Paternal causes, although disregarded by some authorities, are generally admitted to exist. Of these syphilis is the most common, but the extremes of youth and old age and debilitated conditions are said to exert the same influence.

Maternal causes are numerous, among them the following are quite common: External violence; falls; heavy lifting; compression by clothing or corsets; compression of a varicose limb; introduction of the uterine sound within the uterus; applications to the cervix; surgical operations, especially of the genital tract; coition; hot climate; hot baths; acute febrile diseases; syphilis; anxiety; fright; shock; constant suckling of a child at the breast; excessive vomiting or diarrhœa; obstinate constipation; the use of certain drugs (cathartics, laxatives, emetics, and emmenagogues); and morbid conditions of the uterus, such as inflammation of the uterine and cervical mucous membranes, irritability of the uterus, displacements (especially retroflexion), fibroids, and peritoneal adhesions.

Ovular causes are diseases or imperfect development of the decidua, vesicular mole, placental hemorrhage and degenerations, excess of amniotic liquor, diseases transmitted from the parents, torsion or compression of the umbilical cord, death of the fœtus, the latter being the most frequent of all causes and the result of one or more of the disturbances mentioned.

(*b*) **Symptoms.** *Hemorrhage*, slight or profuse, which may accompany *uterine contractions* and *pains* or be followed by them. When both hemorrhage and pains are present from the first there can be but little hope of preventing the abortion. Before the third month, as has been mentioned, the ovum generally comes away entire, without rupture of the membranes; after the third month, in the majority of cases, the membranes are ruptured so that the fœtus is expelled first, the placenta and membranes following in a short time unless there should be a retention of them.

(*c*) **Prognosis.** The immediate dangers of abortion are *hemorrhage* and *septicæmia; subinvolution*, *cellulitis*, and *endometritis* are frequent results.

The death-rate of criminal abortions is high; of those resulting from unavoidable causes it is said to be but little less than that of labor at full term.

(*d*) **Treatment.** *Prophylactic; of threatened abortion; of inevitable abortion.*

Prophylactic. Removal of cause (endometritis, retroflexion, syphilis, etc.); rest in bed, especially at times corresponding with the menstrual periods; removal of all compression; avoidance of sexual intercourse.

Threatened abortion. If the hemorrhage be not severe, if the amniotic liquor has not escaped, if there be but slight dilatation of the os, and little or no pain, the abortion may be prevented. Rest in bed, light and unstimulating diet, avoidance of hot drinks, restoration of the uterus when displaced, anodynes (morphia, etc.), are indicated.

Inevitable abortion. When the os is dilated and the ovum can be felt presenting at it, when the amniotic liquor has escaped, or when the hemorrhage is excessive and accompanied by severe pains, abortion may be regarded as inevitable. Where such is the case arrest of the hemorrhage and evacuation of the uterus are the two steps indicated.

The means employed to effect these are tampons in the vagina and cervix, unless the ovum itself acts as a plug (tampons should not be introduced when there is a hope of preventing abortion, when used they must be changed every eight or twelve hours). Ergot, when the os is well dilated; the finger for removal of the presenting part; forceps; curettes, etc., for the removal of retained membranes, placenta, or portions of fœtus.

Rest in bed for several days should be insisted on, and during the entire period attention to cleanliness is most essential, symptomatic treatment being meanwhile employed.

PART IV.

LABOR.

CHAPTER I.

PHENOMENA OF LABOR.

LABOR usually occurs at a time corresponding with the tenth menstrual period after conception.

I. CAUSES.—The following causes of labor, none of which are entirely satisfactory, have been assigned.

(*a*) **The efforts of the fœtus** and supposed changes in its vascular system or its various organs were for a long time considered by the old obstetricians the causes of the onset of labor.

(*b*) **Distension of the uterus** to a certain degree is said to be followed by a reaction in the form of uterine contractions; in multiple pregnancies and excess of amniotic liquor the distension is often greater than at full term of normal pregnancy; but, even in these cases, although the liability is greater, abortions or premature labors do not always occur.

(*c*) **Fatty degeneration of the decidua** is said to occur at the end of pregnancy and cause detachment of the ovum; in order to expel the foreign body which the uterus would thus contain, uterine contractions commence.

(*d*) **Irritability of the uterus,** which is always more marked at the menstrual periods, especially during the early months of pregnancy, increases during the latter

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months until the time of the tenth menstruation after conception, when it is supposed to give rise to uterine contractions.

(*e*) **Changes in the placental circulation,** by which the amount of venous blood in its sinuses is increased, are thought to exert an influence in this direction.

It is doubtful whether any one of the above is an invariable cause of the commencement of normal labor; several of them acting together may influence its onset; but the *active* or *immediate cause* is the uterus itself and the contractions which it undergoes.

2. MUSCULAR MECHANISM.—The expulsion of the child is effected, as has been mentioned, by the contractions of the uterus aided by the contractions of the abdominal muscles; the former are not under the mother's control, the latter are only partly so.

(*a*) **Uterine contractions** of the painless variety occur throughout pregnancy; when labor commences they are accompanied by pain.

These contractions are intermittent, the relaxations between them allowing the circulation which was temporarily checked to be re-established. The duration of one contraction varies, the average time being less than one minute; at the commencement of labor they are of short duration and separated from each other by a considerable interval (one-half hour); but as the period of delivery approaches they become more frequent and intense (one to five minutes apart) and cause dilatation of the os.

It was supposed by some that the contractions began in the cervix and passed gradually upward to the fundus, returning to the cervix; now it is believed that their origin is at the fundus, and that they pass downward in a wave-like motion to the cervix.

During contraction the uterus becomes more globular, its transverse diameter is diminished, and its antero-posterior increased; the cervix becomes dilated and thinned, while the body and fundus are thickened. The broad and round ligaments also contract, the latter, by their contractions, drawing the fundus forward against the abdominal wall.

(*b*) **Abdominal contractions** add force to the uterine action in effecting expulsion; at first the efforts are voluntary, but finally, like the uterine contractions, they cannot be controlled by the patient.

(*c*) **Labor-pains** vary greatly in their intensity in different women; during the first stage of labor the pains come on with the uterine contractions and disappear with them; they are felt over the sacrum from which they radiate to the abdomen and thighs; they are described as dull-aching or grinding, being caused by compression of the nerve filaments during the contractions and to dilatation and stretching of the cervix. When the os is fully dilated the character of the pains changes; the expulsion or bearing-down pains then commence, and the suffering becomes more intense both on account of the pressure of the head upon the sacral plexus, which causes the pains and cramps in the thighs, and on account of the stretching of the soft parts.

3. STAGES OF LABOR.—The stages of labor are: *Premonitory*, *first*, *second*, *third*.

(*a*) **Premonitory symptoms** usually commence a week or two before delivery; sometimes, however, labor sets in suddenly without their occurrence.

On account of relaxation of the soft parts the uterus sinks deeper into the pelvis, while the fundus falls more forward, thus lessening the pressure above and relieving somewhat the respiratory and gastric disturbances.

Another result of the "sinking" of the uterine mass is increased pressure upon the lower pelvic contents and consequent irritability of the bladder and bowels, difficult walking, hemorrhoids, and increased œdema of the lower extremities.

The uterine contractions may become manifest to the woman herself, and may be accompanied by occasional slight pains; the pains, or painful contractions, may become so severe that labor is thought to have set in, but it will be found that these "false pains," as they are called, which are felt most in front, have no effect in dilating the os, and are kept up by some local irritation. An enema will often cause their disappearance.

During this stage a *real shortening* of the cervix generally occurs and indicates commencing dilatation; the mucous discharge from the cavity of the cervix becomes more abundant, and may be tinged with blood from the lacerated capillary bloodvessels; the external genitals are swollen and moistened by their own and the vaginal secretions which are poured out in greater quantity.

(*b*) **First stage.** The first stage, called that of *dilatation*, is from the commencement of effective pains till complete dilatation of the external os.

The dilatation is effected in three ways—by mechanical stretching by the amniotic liquor contained within its sac (or in the absence of this by the presenting part of the fœtus); by contraction of the longitudinal muscular fibres; by relaxation of the circular fibres.

During this stage the woman is generally able to be about; as dilatation advances the pains recur at shorter intervals and become more severe; the temperature is elevated, and during each pain there is an acceleration of the pulse; the genitals are covered with a very copious secretion which lubricates and relaxes them, and also indicates a rapid termination of labor; the membranes protrude farther during each pain and may extend to the vulva, but should not rupture until the dilatation is complete. Sometimes they remain intact until the head has passed the vulva, when the child is said to be born with a "caul;" in rare cases the ovum is expelled entire. If rupture do not occur when the dilatation is complete labor is generally delayed; when rupture occurs all of the fluid does not immediately escape, but continues to ooze out at the commencement of each pain, and some is usually retained until after the birth of the child. At the termination of the first stage of labor the cervix and vagina form a continuous canal.

(*c*) **Second stage.** The second stage, called that of *expulsion*, is from dilatation of the external os till complete extrusion of the child. If the membranes rupture when the dilatation is complete the character of the pains is entirely altered; at first there is a short cessation; then, assisted by the abdominal contractions, more powerful and prolonged pains of a bearing-down nature come on, following each other in quick succession until the head is born. In order to aid in the expulsion the breath is held, the feet are involuntarily placed against some support, and the hands grasp anything that is within reach. After the exit of the head the body is generally expelled by the next pain; a gush of amniotic liquor mingled with blood immediately follows and terminates the second stage of labor.

(*d*) **Third stage.** The third stage, called that of the *after-birth*, is from expulsion of the child till complete extrusion of placenta and membranes.

During the first part of this stage the pains cease for a short time, but with the uterine contractions they commence again, continuing with intermissions until the placenta and membranes have been expelled into the vagina or through the vulva; if left to itself the placenta is usually expelled spontaneously with little hemorrhage, its lower margin coming first. If traction has been made on the cord it generally comes down with its fœtal surface foremost, and by suction on the uterine vessels causes blood to be poured out from them. By detachment of the placenta the maternal vessels are torn across, but hemorrhage is prevented by the formation of clots and by the uterine contractions.

At the termination of the third stage of labor the uterus should be firmly contracted so that it can be felt in the hypogastric region about the size of a fœtal head.

For several hours or days, especially in multiparæ, alternate contractions and relaxations are liable to occur and give rise to the so-called "after-pains."

4. DURATION OF LABOR.—Labor is usually longer and more difficult in primiparæ than in multiparæ; also in primiparæ beyond the age of thirty years than in those under that age, and with male than with female children.

The usual duration of labor in primiparæ is probably twelve to twenty hours; in multiparæ, six to ten hours. The first stage is longer than the second, the relation which they bear to each other being variously estimated at from one to two, to one to four or five.

The second and third stages of labor may be completed at the same time by the immediate expulsion of the after-birth; the third stage usually terminates in about twenty minutes after the second, but may be greatly prolonged.

CHAPTER II.

MECHANISM OF LABOR.

The presentations of the fœtus at the pelvic brim may be classified as three, viz: *Presentation of the head; presentation of the pelvis; presentation of the trunk (transverse presentation).* The number of the positions of each presenting part is four, and corresponds with the number of quadrants into which the pelvis is divided by antero-posterior and transverse lines, the name being the same as that of the quadrant in which it lies.

I. PRESENTATIONS OF THE HEAD.—Head presentations are diagnosed by abdominal palpation, by hearing the fœtal heart-sounds below the umbilicus, and by the vaginal touch.

There are three varieties of head presentation: of the vertex or occiput; of the face; of the brow.

(*a*) **Vertex presentations** occur in about ninety-five per cent. of all cases of labor. The antero-posterior diameter of the head enters the pelvis at the brim in either a transverse, an oblique, or an intermediate diameter with the occiput anterior or posterior; in the cavity it occupies an oblique diameter.

The *positions* of the vertex are four, being named according to the pelvic quadrant in which the occiput lies. They are as follows :—

First Position or *Left Occipito-Anterior* (L. O. A.).—The occiput at the left acetabulum.

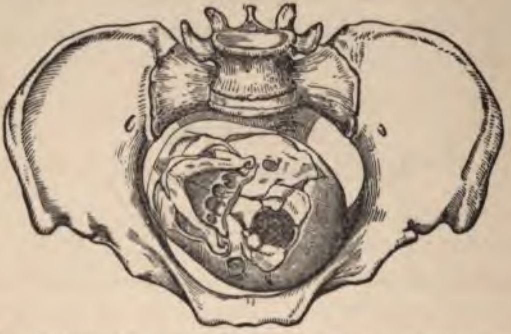

FIG. 26.—Vertex presentation. First or left occipito-anterior position.

Second Position or *Right Occipito-Anterior* (R. O. A.).—The occiput at the right acetabulum.

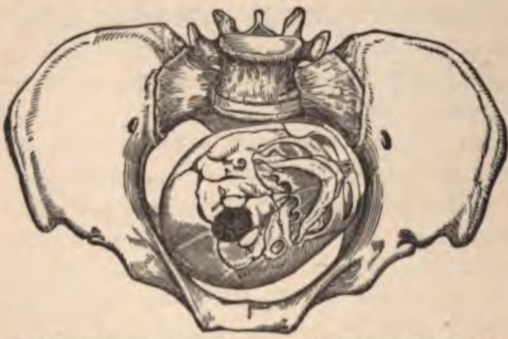

FIG. 27.—Vertex presentation. Second or right occipito-anterior position.

Third Position or *Right Occipito-Posterior* (R. O. P.)

—The occiput at the right sacro-iliac joint. (The reverse of the first position.)

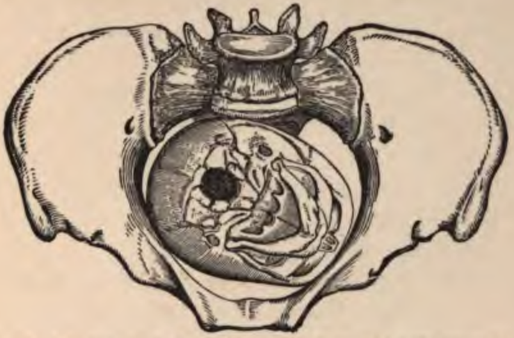

FIG. 28.—Vertex presentation. Third or right occipito-posterior position.

Fourth Position or *Left Occipito-Posterior* (L. O. P.). —The occiput at the left sacro-iliac joint. (The reverse of the second position.)

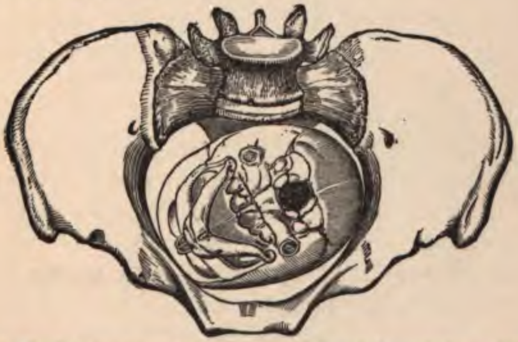

FIG. 29.—Vertex presentation. Fourth or left occipito-posterior position.

The first position is the one usually met with; the fourth is least common.

The movements undergone by the head in its expulsion are as follows: (1) *flexion*, (2) *descent*, (3) *internal rotation*, (4) *extension*, (5) *external rotation*, the latter movement being followed by (6) *expulsion of the body*.

Flexion is a bending of the chin toward the chest to accommodate the fœtal head to the canal of the pelvis by substituting a shorter diameter—the suboccipito-bregmatic, for a longer one—the occipito-frontal.

Descent accompanies and follows flexion, the antero-posterior diameter of the head being in the oblique diameter of the pelvis.

Internal rotation is a movement of the head and trunk from the oblique to the antero-posterior diameter; always in first and second positions, and usually in third and fourth positions the occiput turns in front under the pubic arch.

Extension is the result of the head being pushed against the resisting perineum; the neck is fastened under the pubic arch, and while the pressure from above and below is continued the head is rolled out of the vulvar opening.

External rotation is a turning of the head from the antero-posterior to the transverse position after its expulsion and as soon as the uterine contractions are renewed. The occiput rotates to the side at which it originally was.

Expulsion of the body is usually effected by the next pain; the sub-pubic shoulder makes its appearance first, but, as a rule, the posterior one is first disengaged.

(*b*) **Face presentations** occur once in about 250 labors. They are due to a backward extension of the head the reverse of flexion, the extension being the result of either lateral uterine obliquity, pelvic narrowing, enlargement of the neck and thorax or unusual size or shape of the head.

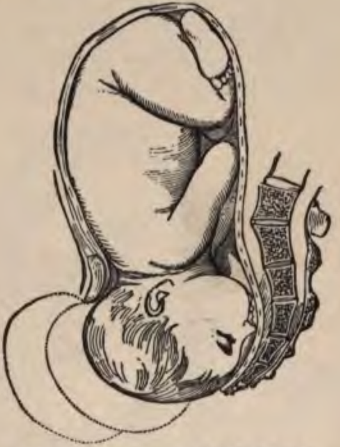

FIG. 30.—Extension of the fœtal head.

Face presentations are diagnosed with certainty by the vaginal touch.

The *positions* of the face are four, being named according to the pelvic quadrant in which the forehead lies. (They are sometimes named from the position of the chin.)

First Position or *Left Fronto-Anterior* (right mento-posterior).—The forehead at the left acetabulum.

Second Position or *Right Fronto-Anterior* (left mento-posterior).—The forehead at the right acetabulum.

Third Position or *Right Fronto-Posterior* (left mento-anterior).—The forehead at the right sacro-iliac joint. (The reverse of the first position.)

Fourth Position or *Left Fronto-Posterior* (right mento-anterior).—The forehead at the left sacro-iliac joint. (The reverse of the second position.)

As in positions of the vertex, the first position is the one usually met with; the fourth is least common.

The movements undergone closely correspond with those of the vertex; they are as follows: (1) *Extension*, (2) *descent*, (3) *internal rotation*, (4) *flexion*, (5) *external rotation*, (6) *expulsion of the body*.

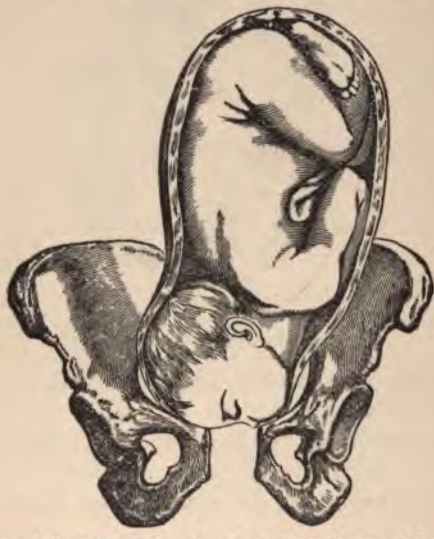

FIG. 31.—Presentation of the face at the pelvic brim in the second facial position.

Labor in face presentations will generally terminate naturally, but in the majority of cases the prognosis for the child is unfavorable.

(*c*) **Brow presentation** is an intermediate between flexion and extension or presentation of the vertex and that of the face.

It usually exists as such at the pelvic brim; when the head enters the pelvis either flexion or extension must occur before delivery can be effected, as it is the largest diameter of the head that is engaged. (The occipito-mental diameter.)

The head may be arrested in this position; assistance will then be required.

Brow presentations are diagnosed by the vaginal touch, the anterior fontanelle, orbit and root of the nose being easily distinguished.

2. PRESENTATIONS OF THE PELVIS.—Pelvic presentations are diagnosed by abdominal palpation, by hearing the fœtal heart-sounds on a level with or above the umbilicus and by the vaginal touch; they occur once in about thirty to forty labors and are more common with premature births, hydrocephalic or dead fœtuses, with excess of the amniotic liquor, contractions of the pelvis and laxity of the uterus and abdominal walls. The results to the mother are not unfavorable;but the infantile mortality is much higher than in presentations of the vertex.

There are two varieties of pelvic presentation: *Of the breech; of the foot or knee.*

(*a*) **Breech presentations.** About 60 per cent. of pelvic presentations are of the breech.

The *positions* of the breech are four, being named according to the pelvic quadrant in which the sacrum lies.

First Position or *Left Sacro-Anterior.*—The sacrum at the left acetabulum.

Second Position or *Right Sacro-Anterior.*—The sacrum at the right acetabulum.

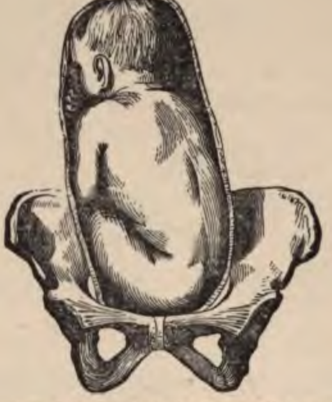

FIG. 32.—Presentation of the breech in the first or left sacro-anterior position.

Third Position or *Right Sacro-Posterior.*—The sacrum at the right sacro-iliac joint.

Fourth Position or *Left Sacro-Posterior.*—The sacrum at the left sacro-iliac joint.

The first position is the most common of these.

The movements undergone are as follows: (1) *Compression of the pelvis*, (2) *descent*, (3) *internal rotation*, (4) *delivery of the body*, (5) *external rotation*, (6) *expulsion of the head.*

(*b*) **Foot or knee presentations** often occur with those of the breech, delivery being accomplished in the same way.

In making examination by the touch the foot may be mistaken for the hand; it should be remembered that the toes are shorter and all in the same line, that the great toe cannot be brought in apposition with the others as the thumb can with the fingers, that the foot is larger and narrower, the outer border being thin and rounded while the inner is thick and hollowed. The knee may be mistaken for the elbow, but is distinguished by its larger size and by the patella.

3. PRESENTATIONS OF THE TRUNK (*transverse presentations*).—Transverse presentations are diagnosed by abdominal palpation and by the vaginal touch; they occur once in about 260 labors, and are more common with premature or dead children, with excess of amniotic liquor, pelvic deformities and laxity of the uterus with increase in its transverse diameter.

The prognosis for both mother and child is more unfavorable than in face presentations; natural delivery by spontaneous version or evolution is rarely accomplished, and an early interference is therefore necessary.

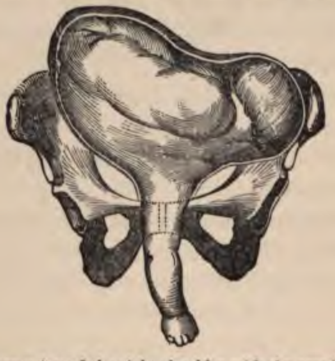

FIG. 33.—Presentation of the right shoulder with the arm hanging down.

In nearly all cases of transverse presentation the shoulder occupies the pelvic brim; the elbow or hand may come down and protrude from the vulva. When the hand presents the position of the fœtus can be determined by finding out which hand it is; if it be the right, and the palm turn upward, the thumb will point to the right side of the mother, and *vice versâ*.

The *positions* of the trunk are generally classified as two; they depend on the relation of the back of the fœtus to the abdomen of the mother, and are known as *dorso-anterior* and *dorso-posterior;* the former is the most common of these.

Taking into account the iliac fossa in which the head lies, these may be subdivided into four positions as follows:—

First Position or *Left Dorso-Anterior.*—The back at the left acetabulum.

Second Position or *Right Dorso-Anterior.*—The back at the right acetabulum.

Third Position or *Right Dorso-Posterior.*—The back at the right sacro-iliac joint.

Fourth Position or *Left Dorso-Posterior.*—The back at the left sacro-iliac joint.

In spontaneous evolution the movements undergone are as follows: (1) *Compression of the shoulder*, (2) *descent*, (3) *internal rotation*, (4) *delivery of the body*, (5) *external rotation*, (6) *expulsion of the head.*

CHAPTER III.

MANAGEMENT OF NORMAL LABOR.

When the accoucheur is summoned he should go at once; by prompt attendance he may prevent various accidents to both mother and child, or have a better opportunity for correcting any malpresentation that may exist.

The following articles may be required, and should if possible be taken along: Obstetric forceps; a pocket case of instruments; a catheter; needles (curved or straight); a needle holder; silk or wire for sutures; a hypodermic syringe; a stethoscope; Barnes' dilators; ergot; ether; chloroform; chloral; morphia; Monsel's solution of iron. The syringe (vaginal and rectal), scissors, thread, and abdominal bandage are usually furnished by the patient or nurse.

The room should be airy and quiet, the bed of easy access and not too low; the bedding firm (not feather) and protected by a waterproof sheet (rubber or oilcloth), or, in the absence of this, by several thicknesses of paper, either being covered with a blanket or cloths which will absorb the discharges.

The patient should be in her ordinary night dress, underneath which a special petticoat is worn; while out of bed the night dress is covered by an outside wrapper, but when delivery approaches the latter is removed, the night dress tucked up under the arms, and the petticoat left to cover the patient. The position of the patient when in bed varies in different countries, the usual ones being on the back or on the left side.

On the back the progress of labor in the first stage is more rapid, as the weight of the child, assisted by more effective abdominal contractions, stimulates the uterus to greater action.

On the left side the exposure is less, the right lateral obliquity is overcome, the pressure upon the perineum is less, and the risks of its rupture diminished.

Before the head has reached the pelvic floor, the dorsal position between sitting and lying is altogether the most favorable; during expulsion, a kneeling or squatting position is the most effective, but attended by greater risks to the perineum.

I. EXAMINATION OF THE PATIENT.—The lying-in room should not be entered abruptly, nor, when there is nothing urgent, should an immediate examination be made.

The presence of the accoucheur usually causes a temporary cessation of the pains; during this time he may inquire when the pains commenced, of their frequency, character, and situation, of the presence of a "show," of the state of the bladder and bowels, of the character of former labors—if the patient is not a primipara—and of her condition during the present pregnancy.

Having secured the confidence and consent of the patient, an examination may be made. The hands should first be washed in warm carbolized water, for cleanliness and to increase the delicacy of touch. If possible, an examination of the abdomen by palpation and auscultation should be made, in order that the positions of the uterus and fœtus and the presence of fœtal life may be ascertained.

The vaginal examination is generally commenced during a pain, but should be continued during the interval of the pains; it is conducted in the usual manner with the patient on her back or left side.

The object is to discover the condition of the vagina; the capacity of the pelvis; the state of the cervix and os (soft or dilated); the condition of the membranes (whether ruptured or unruptured); the presentation and the position.

If the membranes are intact, great care is necessary to avoid their rupture; before their rupture it is difficult to ascertain the exact position of the vertex, which is usually the presenting part in a normal case; as soon as rupture has occurred the fontanelle (usually, the posterior) and sutures can be distinctly felt.

In addition, the following information should be obtained by the examination:—

Whether there is a condition of pregnancy;

Whether labor has commenced;

Whether it is the first or second stage of labor;

Whether the presentation and position are normal;

Whether the patient can be left for a while with safety.

A guarded opinion should invariably be given as to the probable duration of the labor; if the pains are infrequent and weak, and the cervix is rigid and but slightly dilated, a considerable delay may be expected, and the attendant may leave for a short time.

2. FIRST STAGE OF LABOR.—During this time the patient should be encouraged to remain out of bed, to sit, stand, or walk about, but not to exhaustion; if she lie it should be on her back. An occasional vaginal examination should be made to note the progress and general condition; these should not be too frequent, nor, as a rule, should any assistance in the dilatation of the os be attempted. The patient should be restrained during this stage from all bearing-down efforts; the urine should be passed from time to time, and, on account of the patient's frequent desires in this direction, the attendant should occasionally absent himself from the room; if there is retention of urine it will be necessary to use the catheter; the bowels should be evacuated, and for this purpose an enema is usually given; an occasional vaginal injection of some antiseptic solution should be used.

Toward the termination of the first stage the patient should undress and lie upon the bed.

When the dilatation is complete the membranes usually rupture, part of the amniotic liquor pours out, the head descends, and on renewal of the pains the second stage of labor begins; if rupture does not occur at this time the labor may be considerably delayed, and to avoid this, artificial rupture should be resorted to during a pain by means of the finger nail or with some pointed instrument.

3. SECOND STAGE OF LABOR.—During this time the patient usually remains in bed, but change of position and occasional sitting up if desired may be allowed. The customary position being on the left side with the knees drawn up, the nates parallel to the edge of the bed, and the body lying across it, the feet should rest against the foot-board while the hands may grasp a towel or sheet tied to the foot of the bed.

As soon as the membranes are ruptured a vaginal examination should be made, the exact position of the head or presenting part ascertained, and any malposition or prolapse of the cord or of the extremities corrected if possible.

During this stage the examinations should be much more frequent than during the first, and the patient may be urged to "hold her breath" and "bear down" while the feet are supported and the hands pull on the towel.

In the intervals between the pains the anterior lip of the os uteri, should it become engaged between the head and the pubic bone, may be pressed up and held during the next contraction or until the head has passed beyond it.

Too rapid descent or expulsion of the head should be avoided that there may be less risk of rupturing the perineum; when the perineum is distended the patient should cease all voluntary efforts, and attempts may be made to preserve it intact by pulling the perineum forward over the head by means of two fingers in the rectum, pressure being at the same time made by the thumb upon the head in order to restrain its progress.

Another method, as effective and less repulsive, is to push the perineum forward over the head by the thumb and finger placed on either side of it, the pressure upon the head by the tips of the fingers being kept up as before.

When rupture seems inevitable, *episeotomy*, the making of lateral incisions through the vulva, is recommended by some authorities; many others are opposed to the operation.

As soon as expelled the head should be supported by the right hand and its rotation assisted; it should be ascertained whether the cord surrounds the neck, and, if so, it should be gently drawn over the head; if this is not possible, and there is danger of choking the child, it may be quickly ligated in two places and divided between them. With a recurrence of the contracticns and pains the shoulders are usually delivered, and in many instances are the cause of rupture of the already weakened perineum.

In delivery of the body little or no force should be employed, but moderate pressure may be made upon the abdomen that the uterus may contract as its contents are expelled.

Ergot by the mouth or hypodermically is sometimes given at this period in order to assist in the permanent contraction of the uterus, and to prevent *post-partum* hemorrhage.

Unless there is immediate necessity for its use, the administration, if made at all, should be deferred till after removal of the placenta. The child's mouth having been cleaned of secretions, it should be allowed plenty of air, and, if necessary, respiration may be assisted or excited by friction upon the chest, a dash of cold water, or, in extreme cases, by artificial respiration.

A strong and healthy child begins at once to breathe and usually cries; in such cases it is the practice of some to ligate the cord immediately, but it is better to defer this until the pulsations cease or become feeble (one to five minutes), as the child is receiving an additional supply of blood during this time.

The ligature commonly used consists of several strands of strong thread tied together at both ends; it is applied about one and a half to two inches from the umbilicus, and after division of the cord with scissors one-half inch beyond this point, for greater safety, a second ligature may be applied near the cut end, the clots and gelatinous contents having been first pressed out.

It is unnecessary, except for cleanliness, to ligate the placental end of the cord unless the bleeding be profuse or a twin fœtus remain in the uterus.

4. THIRD STAGE OF LABOR.—The proper management of this stage of labor is most important; the duties of the attendant are: to guard against hemorrhage; to promote uterine contractions; and to further the expulsion of the placenta.

The patient should lie on her back, and till the pains return should be allowed to rest, the condition of the uterus being carefully noted by gentle abdominal pressure.

Traction on the cord should be avoided unless the placenta be detached and in the vagina. In the majority of cases the uterine contractions recur in ten to fifteen minutes, when the placenta is expelled without assistance and with slight loss of blood.

The method usually employed, whether there be retention of the placenta or not, is known as Crede's; it is practiced as follows :—

When the contractions begin to recur stimulate them by gentle pressure and friction over the fundus and body of the uterus; when active contractions commence grasp the hard fundus with the hand and compress it between the thumb and fingers, at the same time making downward pressure upon the organ.

By the use of this method during a single pain, or during several successive ones, the placenta is detached and expelled into the vagina; if the pressure be continued it may be forced out of the vulva. Occasionally, when the placenta is detached it will remain in the vagina for some time; if the lower margin can be felt it may be seized with the thumb and finger and gently drawn out of the vulva, being turned around several times that the membranes trailing behind may be twisted into a rope, in which form they are less likely to be torn off and left behind.

While the placenta is being removed and for some time afterward the hand should hold the fundus in its grasp, gentle friction being meanwhile made to secure firm contraction and the expulsion of all clots and shreds of membrane. After its removal the placenta should be carefully examined; if none of the uterine surface is missing, and the double layer of membranes is present, the uterus is known to be empty, at least so far as these are concerned. The perineum should also be examined, and any extensive laceration immediately sewed up.

After removal of the soiled clothes, and when the uterus is firmly contracted, the abdominal bandage or "binder" may be applied, being used as a prophylactic against hemorrhage and as a support to the abdominal viscera. The bandage should be wide enough to reach from the ensiform cartilage to the trochanters; it should be pinned as tightly as is comfortable, and when relaxation of the uterus is feared a pad may be placed beneath it to compress the fundus; the pad is said by some to be a cause of uterine displacement.

If the uterus is firmly contracted, and the pulse has fallen below 100, the patient may be left and allowed to rest or sleep.

5. ANÆSTHETICS AND ANODYNES:—

(*a*) **Chloroform** is the anæsthetic usually employed in labor; it is administered at the termination of the first and during the second stage, just before and with the commencement of each pain, its use being discontinued when the pain is over in order that complete anæsthesia may not be produced.

(*b*) **Ether** may be substituted for chloroform, but its action is slower and less effective; a mixture of alcohol (one part), chloroform (two parts), and ether (three parts), is frequently employed with advantage.

(*c*) **Bromide of ethyl** is administered as chloroform and with the same precautions; while it has been specially advocated as superior to the latter its use has not yet become extensive.

(*d*) **Chloral** is the best anæsthetic during the first stage of labor; not only does it lessen the suffering but rigidity of the cervix is frequently overcome by it.

(*e*) **Morphia** is sometimes used instead of chloral; in cases of normal labor at full term its use is not advisable.

(*f*) **Cocaine muriate**, in solution or in the form of an unguent (10 to 20 per cent.), applied to the cervix, vagina, and vulva will frequently lessen the severity of the suffering.

The disadvantages which in varying degrees attend all forms of anæsthesia during labor are: prolonged labor on account of diminished contractions or pains; *post-partum* hemorrhage.

CHAPTER IV.

ABNORMAL LABOR.

THE causes which render labor abnormal are two: *maternal; fœtal.*

I. MATERNAL CAUSES.—The maternal causes of abnormal labor are as follows:—

Excess of uterine force; deficiency of uterine force; abnormalities of the sexual organs; tumors; anomalies of the pelvis.

(*a*) **Excess of uterine force,** although it is not always followed by unfavorable results, exposes the mother to the dangers of lacerations of the cervix, vagina, and perineum, prolapse of the uterus from incomplete dilatation, uterine inertia with hemorrhage and syncope; the amniotic liquor having been early discharged, the cord may be compressed; the child having been suddenly and unexpectedly expelled may be injured by falling upon the floor; the traction thus made upon the cord may rupture it or cause inversion of the uterus.

Treatment.—The patient should lie on her left side and avoid all efforts at bearing down; rupture of the membranes should be retarded; counter-pressure may be made upon the presenting part while anodynes or anæsthetics are administered.

(*b*) **Deficiency of uterine force.** Weak and inefficient pains result from undue resistance of the soft parts, exhaustion, uterine innervation, excessive uterine distension, malposition of the uterus, a full bladder, a loaded rectum, death of the fœtus, premature rupture of the membranes, or mental impressions, especially of unpleasant character.

When the contractions are inadequate on account of undue resistance of the soft parts they are for a time more vigorous in their action and more painful; if, however, the obstacle be not overcome they may assume tetanic action or become feeble and cease altogether—the latter condition being known as "uterine inertia." Deficiency of uterine force is attended by greater dangers to the mother and child in the second stage of labor than in the first, and after than before rupture of the membranes; inertia occurring in the third stage is more dangerous to the mother than in the first and second stages.

Treatment.—The treatment of this condition varies according to the cause. If the inefficient contractions are attended by excessive suffering, as is often the case, chloral or morphia may be given; if there is innervation of the uterus the position should be frequently changed, while hot vaginal douches and rectal injections may be employed together with hot drinks; if there is anteversion an abdominal bandage may be applied, and the patient kept on her back; if there is excessive distension the membranes may be ruptured provided there is a certain amount of dilatation with relaxation of the soft parts. Artificial dilatation of the os may be effected and followed by application of the forceps.

Quinine and ergot may be used to stimulate the uterine contractions; the former has been found safe and harmless while the latter should be used with caution, being never given in the first stage of labor nor in the second unless there is no obstruction and an early delivery is certain to be accomplished by a restoration of the normal uterine force. Faradization has been successful in the hands of some.

Manual pressure upon the fundus and body of the uterus at the commencement of the contraction and while it lasts increases its force and is perfectly safe to mother and child, if practiced with care when nothing but inertia interferes with delivery.

(*c*) **Abnormalities of the sexual organs**:—

(1) *Atresia of the generative tract*,—of the vulva, vagina, and cervical canal,—is not common, nor is it usually attended by more serious results than delay which, in cervical stenosis, may be considerable.

The obstruction may be congenital or acquired, partial or complete,—the latter being always acquired.

Treatment.—When there is complete closure of either vulva, vagina, or cervical canal, puncture and dilatation will be required.

(2) *Rigidity of the perineum* is a cause of delay in the second stage of labor.

Treatment.—Hot fomentations, digital dilatation, and, to prevent rupture, retarding the progress of the advancing part.

(3) *Rigidity of the cervix* at the commencement of labor is usually the cause of the greater length of the first stage; in primiparæ it is a natural condition, but in parous women is usually caused by inflammatory action resulting in induration and hyperplasia of the cervical tissue.

Treatment.—Moderate rigidity in the early stage, when the membranes are unruptured, requires no treatment. When treatment is necessary, hot vaginal douches or hot baths may be employed; but if the contractions are very painful, chloral should be administered.

When the membranes are ruptured, or before, if the general condition of the patient demands it, artificial dilatation may be effected, either with the finger or fingers in the cervical canal, or by means of the hydrostatic dilator of Barnes. Smearing of the *os* with the extract of belladonna is frequently employed, but with doubtful effect.

(4) *Malposition of the uterus* retards the progress of labor by interfering with the full force of the abdominal muscles and also with the contractions of the uterus itself.

Treatment.—Lateral displacements are corrected by having the patient lie on the side opposite to that of the displacement.

Anteversion and anteflexion are overcome by assuming the dorsal position, and applying the abdominal bandage.

Retroversion and retroflexion rarely exist to full term of gestation; but when either does, the mass must be replaced before delivery can be effected.

(*d*) **Tumors of the generative tract,** or of any of the pelvic structures, if they be of considerable size, may interfere with the natural termination of labor; these are as follows,—œdema of the vulva, thrombus of the vulva and vagina, prolapse of the vaginal walls, vaginal hernia, distended bladder, vesical calculus, fibroid tumor, ovarian tumor, encysted tumor, carcinoma.

Treatment.—If there be œdema of the vulva, make punctures for the escape of the serum; if the thrombus be large, turn out the clot and control the hemorrhage by pressure or applications of Monsel's solution of iron.

If the bladder be distended, use the catheter; if there be an impaction of the rectum, an enema should be given. Vaginal hernia must be reduced; vesical calculi should be pushed above the pelvic brim, crushed, or removed through the rapidly dilated urethra.

If a fibroid be the obstruction, it should, if possible, be pushed up out of the way, or removed if within easy reach; if an ovarian cyst, the pushing of it above the pelvic brim or puncture are indicated; in some cases of fibroid and ovarian tumors the application of the forceps, craniotomy, or even abdominal section, must be resorted to.

(*e*) **Anomalies cf the pelvis.** The anomalies met with are, abnormally large and abnormally small pelves, and the varieties of the latter.

(1) *An abnormally large pelvis* is not favorable to

normal labor; the uterus does not rise out of the pelvis as it should, and as a result of its pressing upon the pelvic contents, vesical, rectal, and circulatory disturbances are set up; malpositions, especially retroversions, are liable to occur; during labor expulsion is apt to be more rapid, causing greater risks of cervical and perineal lacerations.

(2) *Abnormally small pelves* include the following varieties:—

Symmetrically Contracted Pelvis.—A rare form, and one which is usually of high degree.

Flattened Pelvis.—The most common variety, and generally due to rickets. The conjugate diameter is shortened while the transverse is usually normal.

Obliquely Contracted Pelvis.—Due to anchylosis of the sacro-iliac joint, associated with upward pressure upon the acetabulum of the same side, also to lateral spinal curvature.

Transversely Contracted Pelvis.—The contraction being at the brim or at the outlet. Contraction at the brim is a rare deformity; contraction at the outlet is one of the most common. This variety of contraction is generally due to osteo-malacia.

Masculine pelvis is found in muscular women; the bones resemble those of the male, and the cavity is progressively narrowed from above downward, having the appearance of a funnel.

Most of the deformities mentioned, and others too irregular for classification, may be produced by the following affections of the spinal column:—

Spondylolisthesis (a slipping forward of the fourth and fifth lumbar vertebræ), by which the antero-posterior diameter of the inlet is diminished.

Lordosis (a forward bending of the spine), which may diminish the conjugate diameter.

Scoliosis (a lateral bending of the spine), which may diminish the oblique and antero-posterior diameters of the inlet.

Kyphosis (a backward bending of the spine), which may increase the antero-posterior diameter of the inlet.

In addition the pelvis may be deformed and its cavity obstructed by exostoses of the sacrum and of the other pelvic bones.

The *causes* of these deformities may be summed up as follows: rickets; osteo-malacia; anchylosis; spinal curvature; exostosis.

The *diagnosis* of pelvic deformity can only be made by examination and actual measurement; the history and appearance of the patient are valuable adjuncts. These measurements, as previously given, are external and internal.

The *external measurements*, which are made with the ordinary pelvimeter, include the distances between the anterior superior spinous processes of the ilia, the distances between the iliac crests, and the external conjugate, or between the spinous process of the last lumbar vertebra and the upper part of the symphysis pubis. (See page 5.)

The *internal measurements* or diameters of the true pelvis are more important, and at the same time more difficult to obtain. As it is, the true conjugate diameter, or the distance between the promonitory of the sacrum and the nearest point on the inner surface of the symphysis pubis, which is most frequently contracted, its measurement is most important; to obtain this the only practical pelvimeter is the hand.

In the latter months of pregnancy, in cases of deformed pelvis, the uterus is generally situated higher than usual, is more movable, and, as a result, more liable to displacement; abnormal presentation of the fœtus is also more likely to occur. The progress of the labor is slower and the contractions, on account of increased resistance, are more vigorous and painful. The dangers to which the mother is exposed are exhaustion from excessive uterine action, contusions of the uterus, cervix, and vagina which may result in sloughing, and the risks of the various operations which may be necessary.

The *prognosis* for the child is unfavorable; the *caput succedaneum* is large; the contusions of the scalp may end in suppuration; the cranial bones are generally greatly overlapped, and internal changes are likely to occur.

If the deformity is not great, if the head is of small or of medium size and compressible, and if the presentation is favorable, labor is most likely to be terminated naturally by moulding of the head.

Treatment.—The management varies according to the following conditions, which should always be taken into account: The amount of deformity; the size of the fœtus; the age of the fœtus.

When the deformity has been discovered in time, premature labor or even abortion should be induced. As a rule, "if the conjugate diameter is less than three inches, and the transverse less than four inches, a living child of normal size cannot pass through the pelvis."

In the majority of cases, however, the amount of deformity is slight, so that a favorable termination may be expected.

When delivery cannot be effected without assistance, and the measurements are above those just given, the choice of treatment lies between the *forceps* and *version*. Each of these has its advantages and disadvantages; as a rule, the forceps are indicated in the slighter degrees of contraction, version in the greater.

If the conjugate measures less than three inches, but more than one and a half inches, the choice of treatment lies between *embryotomy* and *Cæsarean section* or one of its substitutes, embryotomy always having the preference. If the conjugate measures one and a half inches or less, abdominal section must be performed.

2. FŒTAL CAUSES.—The fœtal causes of abnormal labor are as follows: Malpresentations; great size of the fœtus; multiple pregnancies; extra-uterine pregnancies; death of the fœtus.

(*a*) **Malpresentations** may be enumerated as follows: Occipito-posterior positions; lateral obliquity of the head; face presentations; brow presentations; pelvic presentations; transverse presentations; complicated presentations.

(1) *Occipito-posterior positions* are the result of failure of forward rotation of the occiput in the third and fourth positions of vertex or occiput presentations.

As a rule the head is well flexed, and as the occiput advances the resistance which it meets posteriorly pushes it forward under the pubic arch where there is more space and a better provision for its expulsion; the amount of internal rotation is thus greatly increased, and the position becomes the first or second.

This rotation fails in some cases, generally on account of deficient flexion of the head; delivery is then effected by movement of flexion instead of the ordinary extension; the fronto-occipital diameter being substituted for the sub-occipito-bregmatic, delivery is attended with greater difficulty and with greater risks to the perineum. Artificial delivery may be necessary.

(2) *Lateral obliquity of the head*, called "Naegele obliquity," is a rotation of the head on its antero-posterior axis so that one parietal bone lies deeper in the pelvis than the other. It is not, as was formerly thought, a regular occurrence, being only found when the head and pelvis are disproportionate in size.

In some cases the head may be so inclined that an ear can be felt; as a rule, conversion is effected without assistance; but this failing, the head should not be allowed to remain in its position longer than a few hours after discharge of the waters.

(3) *Face presentations*, as has been said, are unfavorable to the child; labor is, however, in these cases generally completed naturally.

When the chin rotates to the front and the contractions are strong, no interference or assistance is required; when the rotation fails, attempts to effect it may be made with the fingers or with the short straight forceps; if the head has not advanced too far the occiput may be brought down or version performed.

(4) *Brow presentations* are usually spontaneously converted into face or vertex presentations by the occurrence of extension or flexion.

Pressure should be made upward during the pains in order that one of these presentations may be secured; unless the presentation changes or is changed, natural delivery cannot be effected.

(5) *Pelvic presentations* in the majority of cases terminate naturally without special difficulty, but are attended with greater risks to the child.

In these cases interference with the natural process is often a cause of difficulty. The early rupture of the membranes should be avoided; traction should not be made on the presenting or partially born breech until the arms are delivered, as they may thus be extended above the head.

When the body is partially expelled the umbilical cord should be placed in the most roomy portion of the pelvis that the pressure upon it may be lessened, meanwhile its pulsations should be carefully noted.

If the arms are not delivered, being extended above the head, the child's body should be carried well up to the mother's abdomen; then, if the shoulders are within reach the fingers may be slipped over the posterior one until the elbow and forearm are grasped and made to sweep over the face and chest of the child, thus using the natural movements of the joints and avoiding the possibility of fracture which might result from their being drawn directly downward. By carrying the child's body in the opposite direction the other arm may be released by a similar manœuvre.

If delivery of the head now seems to be too long delayed it may be aided or even effected by traction on the trunk, pressure per rectum, or pressure through the abdominal walls, the child's body having been carried well up toward the abdomen of the mother.

If there be much delay the child must perish; so that should these means of delivery prove ineffectual the forceps must be applied.

Occasionally, in third and fourth positions of the breech, the sacrum fails to rotate to the front; in such cases before the birth of the head there is usually no difficulty. If, however, after expulsion of the trunk, rotation of the occiput forward do not occur, the trunk should be drawn backward that the face may sweep under the pubis; if there be extension of the head and if the chin hitch on the pubis the trunk should be drawn forward and upward that the vertex may sweep over the perineum.

It may be necessary to apply the forceps. When there is impacted breech a foot should be brought down, or if this be impossible the index finger or fillet may be slipped over the groin and traction thus made. In such cases an anæsthetic will be found necessary. As a last resort embryotomy is justifiable.

(6) *Transverse presentations* are rarely terminated naturally; in these cases one of the shoulders is sooner or later engaged in the pelvis, and an arm may protrude.

In rare cases delivery is effected by spontaneous evolution; sometimes spontaneous version occurs, but neither of these means of delivery can be relied on. As soon as possible, therefore, version should be performed.

(7) *Complicated presentations* include displacements of limbs, prolapse of limbs, alone or with the presenting part, and prolapse of the umbilical cord.

Dorsal displacement of the arm, in which the forearm of the child becomes thrown across and behind the neck, may occur in presentations of the head or of the pelvis. In the former case the diagnosis is difficult, but being made out it is recommended either to bring down the arm or to perform version; when the pelvis presents the body, as soon as it is delivered, should be carried well backward that the finger may pass behind the symphysis and over the shoulder to liberate the arm.

The upper extremities more frequently prolapse than the lower. A hand or foot may present with the head, or a hand may descend on each side of the head; a hand or arm may descend with the pelvis, or a foot and hand may present simultaneously with this part.

During the intervals between the pains the displaced members should if possible be pushed up; when the foot and hand present together traction should be made on the foot until the breech comes down and the arm ascends; the possibility of a transverse presentation is thus prevented.

Prolapse of the umbilical cord is favored by malpresentations or malpositions, on account of the presenting part not accurately fitting the pelvic brim; excess of amniotic liquor; early or sudden rupture of the membranes; smallness of the fœtus; multiparity; great length and weight of the cord; placenta prævia; and prolapse of the members.

If the cord be subjected to pressure for a length of time its circulation is interfered with, and the child's death is a result. The treatment indicated is to relieve the pressure, and, if possible, restore the cord to its natural position.

This may be accomplished by pushing the cord up and past the presenting part, between the pains, with the fingers. The patient being placed on her hands and knees with the hips elevated and the shoulders on a lower level, the cord is more readily replaced. Some times it will slip back by its own weight into the uterus along its anterior wall which forms an inclined plane.

After replacement the presenting part should be firmly engaged in the brim by pressure over the uterus, after which the patient should lie on her left side with the hips elevated.

Various instruments are used to replace the cord. A simple one is improvised by holding the prolapsed cord with a loop of string passed through a catheter and emerging from its eye; the cord may thus during the interval between the pains be pushed above the presenting part and the instrument withdrawn. If the pulsations in the cord have ceased, no treatment will be necessary.

(*b*) **Great size of the fœtus** is a frequent cause of prolonged and difficult labor. The increase in fœtal size depends on one or more of the following conditions:—

Uniform enlargement of the entire body; excessive development of a particular part; hydrocephalus; hydrothorax, ascites, and retention of urine; tumors; monstrosities.

(1) *Uniform enlargement of the entire body*, although it may cause delay, does not, as a rule, require artificial delivery.

(2) *Excessive development of the head*, apart from hydrocephalus, with premature ossification and closure of the sutures and fontanelles, renders it incompressible and makes the application of the forceps necessary to effect delivery. When such a condition is suspected premature labor may be induced.

A similar condition of the chest and shoulders may give rise to difficulty or endanger the perineum.

(3) *Hydrocephalus* is an accumulation of serum in the cranial cavity by which the head is greatly enlarged. In these cases the pelvis usually presents, but even when the head presents the diagnosis is difficult.

The prognosis for the child is most unfavorable, especially if dystocia result. The treatment consists in lessening the size of the head; this may be done by puncture with a fine trochar, thus permitting the fluid to escape.

The forceps may be applied, but there is great danger of their slipping. These means failing, perforation should be performed and delivery effected by traction on the head or by podalic version.

In pelvic presentations of such cases, if delivery cannot be effected by traction and supra-pubic pressure, perforation will be necessary although difficult to accomplish.

(4) *Hydrothorax*, *ascites*, and *retention of urine* sometimes exist before delivery with which they may interfere; the treatment is puncture with a trochar or aspirator and evacuation of the fluid; for the removal of retained urine the catheter must be used.

(5) *Tumors of the fœtus*, such as encephaloid, spina-bifida, fibroids, cysts, and fibro-cystic developments of the various organs may prevent natural delivery.

The treatment consists in evacuation or removal, as the case may require.

(6) *Monstrosities* may be single or double; of each kind there are numerous varieties. Of the cases on record the majority were delivered naturally and without much trouble. It is claimed by some that labor in these cases is generally premature or that the children

have been dead for some time and are therefore of small size, which may account for the large number of natural deliveries.

(*c*) **Multiple pregnancies** are rarely terminated by difficult labor; as a rule the presence of a second fœtus is not suspected until after the birth of the first, when the uterus is found to be nearly as large as it was before. In the majority of cases both children present by the head; next in frequency is the head of one and the breech of the other; in a few cases both breeches present.

There is usually some delay in the birth of the first child from interference with the normal uterine action by over-distension or unfavorable presentation.

After the birth of the first child there is usually a cessation of the pains for a quarter of an hour or more; during this interval the cord should be tied and cut, care being taken to tie the placental as well as the fœtal end.

The pains generally recur in about twenty minutes when the second child is quickly delivered, after which the two placentæ are expelled in the ordinary way.

Should delay occur in the expulsion of the second child, uterine action may be stimulated by pressure and friction over the uterus, and by the administration of ergot; the membranes should be ruptured as soon as they are within reach; if there is a malpresentation, version can be easily performed; or if the head is engaged in the pelvis, the forceps should be applied. The uterus having been over-distended is liable to inertia, consequently there is danger of *post-partum* hemorrhage; on this account the birth of the second child should be delayed rather than hurried.

Occasionally, on account of great size of the pelvis, small size of the fœtuses, a single amniotic sac or the premature rupture of the membranes, one fœtus may interfere with the delivery of the other. When both heads present at the brim, one should be pushed up and the other brought down with the forceps.

When the first child presents by the breech, and is delivered as far as the head, the second head having entered the pelvis, further delivery is prevented by their interlocking. Attempts may be made to push back the second head, the patient being in the knee-chest position; the forceps may be applied to the second head in order to drag it past the body of the first child; the first child may be decapitated, thus rendering easy the delivery of the second, or the head of the second child may be perforated and the first child delivered.

(*d*) **Extra-uterine pregnancies** are serious complications to mother and child; the former may survive but the latter almost always perishes. The diagnosis, although difficult in the early months, may be made by careful examination; the uterus is found enlarged but displaced; there is less cervical softening; the signs of pregnancy are present but the uterus does not enlarge after the third or fourth month; attacks of abdominal pain may occur; if they are due to rupture of the tube the attacks may be accompanied by collapse and signs of internal hemorrhage.

There is still doubt about the proper management of these cases. During the early months fœtal life has in some cases been destroyed by electricity, but at this period abdominal section with removal of the cyst and its contents is probably the best procedure. In the latter half of pregnancy, before death of the fœtus, the results of abdominal section have been almost invariably fatal; if the operation be delayed until after the fœtus is dead, on account of obliteration of the placental circulation, the mother's chances of recovery are increased. Where death of the fœtus has occurred it is advisable to delay operation until the gravity of the mother's symptoms has subsided or until there is some indication of the channel through which the fœtus will be expelled.

(*e*) **Death of the fœtus** is liable to occur at any period of gestation, but the dead fœtus is not thrown off by the uterus until it acts as a foreign body. The time during which it may be retained varies from a few hours to several weeks.

The indications of fœtal death are, cessation of its movements, a feeling of coldness and weight in the uterine region, flaccidity of the breasts, absence of the heart-sounds where previously heard, impairment of the mother's health and offensive breath, offensive discharges from the uterus, and during labor a looseness of the cranial bones and absence of the caput succedaneum.

Labor is generally more tedious on account of torpid uterine action, but apart from the delay no unusual difficulty is to be feared.

CHAPTER V.

COMPLICATED LABOR.

THE complications which may occur immediately before, during, or immediately after labor, are as follows: *Eclampsia; placenta prævia; hemorrhage; retention of the placenta; inversion of the uterus; rupture and laceration of the genital canal; thrombus of the vagina and vulva.*

I. ECLAMPSIA, also called *puerperal convulsions*, may occur in connection with pregnancy, labor, or the puerperal state. The convulsions resemble those of epilepsy, but should be distinguished from them, from hysterical convulsions, and from convulsions due to brain lesions. They occur once in about 500 labors, and in the majority of cases affect primiparæ ; they most frequently commence while labor is in progress, and are less frequent in the puerperal state than during pregnancy. The cause of eclampsia is still doubtful; as a rule, it is associated with renal disease, albuminuria, and suppression of urine.

Most authorities claim that the convulsions are due to changes in the kidney structure which changes result in albuminuria, renal insufficiency, and the consequent retention of poisonous products in the blood. The urea thus retained is thought by some to be decomposed and to produce carbonate of ammonia, the supposed toxic agent according to this theory. The poison is probably not a single element, but made up of the various urinary constituents which are retained in the blood.

Another theory is that of reflex irritation of the nerve centres which have an increased irritability in pregnancy, combined with an extreme watery condition of the blood or with retention of toxic agents in it (uræmia or urinæmia). It is claimed that in some cases the reflex irritation alone (the gravid uterus and its contents) may excite them, but that in the majority of cases the reflex irritation must be associated with changes in the kidney structure and renal insufficiency. Cerebrospinal congestion was once thought to be a cause of eclampsia, but is now generally admitted to be a result.

Cerebral anæmia produced by pressure of serous effusion upon the small cerebral vessels has been frequently found on autopsy, and is given as a cause of the convulsions; it is probable that the effusion is the result of the convulsions rather than the result of hydræmia or previous increase in arterial pressure.

Eclampsia may occur without previous symptoms, but is usually preceded by headache, vertigo, disturbance of vision, gastric disturbance, impairment of the intellect, general œdema, albuminuria, and partial or total suppression of urine.

After a longer or shorter prodromal stage the attack sets in suddenly; it consists of two stages, that of *tonic* convulsion, that of *clonic* convulsion.

The convulsions commence in the facial muscles, and gradually involve all the muscles of the body. There is complete loss of consciousness during and after the attack, the coma becoming more marked with each succeeding one. At the commencement of the attack respiration ceases; later, it is hurried and irregular. There is rarely a single convulsion, in some cases there have been more than a hundred. The pulse becomes small and rapid, and there is a considerable rise in temperature.

Death usually results from carbonic-acid poisoning, nervous exhaustion, or a combination of asphyxia and exhaustion; eclampsia predisposes to *post-partum* hemorrhage, puerperal inflammations, and mental disturbances.

The prognosis for mother and child is always serious, the maternal mortality being about thirty per cent.; the earlier the convulsions occur the more unfavorable the prognosis.

Treatment.—Prophylactic treatment includes what has been mentioned for cases of albuminuria; when cerebral symptoms begin to show themselves, bromide of potassium, chloral, and a hydragogue cathartic should be administered. When the attack comes on before labor, if the pulse is strong, and there seems to be cerebral congestion, bleeding is indicated, but it should not be carried to the extent of depression. During the attack chloroform should be administered by inhalation; chloral by the mouth, if possible, or by rectal injection (ʒss. to ʒj.) should be given at intervals until it produces a decided effect; morphia hypodermically (gr. ¼) is recommended; pilocarpine, nitrite of amyl, and nitroglycerine have also been tried with some success; the hot bath has been recommended and successfully tried in a few cases.

In a large proportion of cases the convulsions cease after the birth of the child. Delivery should therefore be hastened as much as possible without incurring additional risks to the mother; if eclampsia come on before the commencement of labor premature labor may be induced.

2. PLACENTA PRÆVIA is the attachment of the placenta at the lower segment of the uterine cavity; some authorities recognize four varieties as follows: *Central*, *partial*, *marginal*, and *lateral;* others recognize only two, complete or *central*, and incomplete or *marginal.* Central attachment of the placenta is a rare occurrence; the marginal and lateral attachments are the most common.

Placenta prævia occurs once in about 570 labors, is much more frequent in multiparæ than in primiparæ, and in the poor than in the rich.

The cause of placenta prævia is the attachment of the ovum at the lower segment of the uterine cavity, either from its having fallen down from the usual point of attachment, from incomplete abortion, or from impregnation of an ovule in this situation.

The occurrence of placenta prævia is favored by abnormal size and unusual shape of the uterine cavity, diseased conditions of its mucous membrane, and spasmodic uterine contractions.

The first symptom is a sudden loss of blood which usually occurs without warning or pain. Hemorrhage rarely occurs before the end of the sixth month, being more often nearer the full period; sometimes it does not come on until labor has commenced. If the hemorrhage come on early it may be but slight; but a recurrence is to be feared as it is liable to terminate fatally. If the hemorrhage come on when labor has commenced it may be excessive and have the same fatal termination.

The blood comes from the arteries and veins in the uterine wall from which the placenta has been separated; also, from the separated placental surface.

The cause of this separation before full term may be the dilatation of the internal os, which is thought by some to take place during the last two months of gestation; the rapid increase in the cervical development toward the end of pregnancy; the partial separation of the placenta from accidental causes; the rupture of a utero-placental vessel near the internal os; or, the rupture of a marginal utero-placental sinus.

Hemorrhage at the commencement of labor is explained by the dilatation of the cervix which is known to occur at this time.

When the placenta has been completely detached, or after separation of the membranes, or when the presenting part comes down and presses upon the open vessels, the hemorrhage ceases, the prognosis for mother and child is unfavorable. Of the former about 25 per cent. die, of the latter about 50 per cent.

Malpresentations are common in placenta prævia on account of the large size of the uterine cavity, the frequent occurrence of premature labor, and because the placenta prevents the head occupying the lower segment of the uterus.

Treatment (Playfair).—When a sudden hemorrhage occurs in the latter months of pregnancy placenta prævia should be suspected and a careful vaginal examination made. Before the child has reached a viable age temporize, provided the hemorrhage is not excessive, until pregnancy has advanced sufficiently to afford a reasonable hope of saving the child.

For this purpose the chief indication is absolute rest in bed, to which other accessory means of preventing hemorrhage, such as cold, astringents, etc., may be added.

In hemorrhage occurring after the seventh month of utero-gestation no attempt should be made to prolong the pregnancy.

In all cases in which it can be easily effected the membranes should be ruptured. By this means uterine contractions are favored and the bleeding vessels compressed.

If the hemorrhage has stopped, the case may be left to nature. If, however, the flooding continue, and the os be not sufficiently dilated to admit of the labor being readily terminated by turning, the os and the vagina should be carefully plugged, while uterine contractions are promoted by abdominal bandages, uterine compression, and ergot. The plug must not be left in beyond a few hours.

If on removal of the plug the os be not sufficiently expanded, and the general condition of the patient be good, the labor may be terminated by turning, the bipolar method being used if possible. If the os be not open enough, it may be advantageously dilated by means of a Barnes' bag, which also acts as a plug.

Instead of or before resorting to turning the placenta may be separated around the site of its attachment to the cervix. This practice is specially to be preferred when the patient is much exhausted and in a condition unfavorable for bearing the shock of turning.

3. HEMORRHAGE may occur before or after delivery.

(*a*) **Hemorrhage before delivery** may be due to *placenta prævia*, or it may be *accidental.*

Accidental hemorrhage is due to the separation of a normally situated placenta; the blood may find exit between the membranes and decidua, or it may collect within the uterus and give rise to "concealed hemorrhage."

Accidental hemorrhage rarely occurs to an alarming extent until the latter months of pregnancy.

The causes are: direct violence; a fall or shock; excessive muscular exertion; unusually strong uterine contractions. Diseased conditions of the uterus, membranes, and placenta, such as would produce hemorrhage and abortion in the earlier months, may cause the placental separation and consequent hemorrhage; on this account the accident rarely happens to primiparæ and those in good health. When the blood escapes from the vagina the condition of affairs is readily made out; if the hemorrhage be concealed it may continue undetected until alarming symptoms of collapse set in.

The prognosis for mother and child is always bad; when the hemorrhage is concealed the mortality to both is still greater.

Treatment.—The membranes should be ruptured as soon as possible; in cases of slight hemorrhage this alone may control it, but in order to guard against concealed hemorrhage a firm abdominal binder should be applied. If the hemorrhage continue uterine contractions may be excited by friction or by the use of ergot; the os should be dilated, and if delivery cannot be quickly effected the forceps or version must be employed.

(*b*) **Hemorrhage after delivery** (*post-partum hemorrhage*) may occur during the third stage of labor, shortly after its completion, or after an interval of days or weeks.

The causes of *post-partum hemorrhage* are: failure of or interference with the formation of thrombi in the veins; lacerations of the cervix, vagina, and perineum.

Uterine inertia is a result of protracted labor, precipitate labor, over-distension of the uterus from twins or excessive amniotic liquor, hemorrhage before delivery, or exhaustion.

Contraction of the uterus may be hindered by retained placenta (all or a part), clots, shreds of membrane, peritoneal adhesions, or tumors.

Formation of thrombi is prevented by sudden movements, straining, coughing, etc.

Hemorrhage occurring a considerable time after labor is due to an atonic condition of the uterus produced by the presence of clots, shreds of membrane, or pieces of placenta in the uterine cavity, or to expulsion of coagula in the mouths of the vessels by suddenly rising, by exertion and straining, by stimulants, displacements of the uterus, inversion of the uterus, laceration of the cervix, thrombi, and fibroid tumors.

The hemorrhage may commence immediately after the birth of the child and before the expulsion of the placenta; in this case it is due to partial or entire separation of the placenta not accompanied by uterine contraction. It may commence gradually or suddenly, and in some cases is concealed. Before and after the hemorrhage there is usually a marked frequency of the pulse, and the hard uterine tumor cannot be felt through the abdominal wall. The loss of blood may be great and the symptoms threatening, but recovery generally takes place.

Treatment.—Post-partum hemorrhage may be prevented by keeping up continuous uterine contraction after delivery; after the birth of the child the condition of the uterus should be carefully watched, the contracted fundus being continually under the grasp of the hand. Care should be exercised in removal of the placenta that none of it is left behind, that the membranes come away, and that all clots are expelled. If for any reason flooding is to be feared a full dose of ergot should be administered shortly before the birth of the child if there is every indication that delivery will shortly be effected; the abdominal binder should not be applied for a considerable time after expulsion of the placenta, nor until the uterus is firmly contracted; the patient should be carefully watched until the pulse has returned to its natural state or is below 100.

When the hemorrhage occurs prompt treatment is necessary; the two indications are: production of uterine contractions; production of thrombi in the vessels. Of these, the first is the safer as well as the more effective method. If bleeding commence before the placenta is expelled, pass the hand gently into the uterus and clear it of its contents. If the bleeding continue after the placenta has been removed, or after its expulsion, place the patient on her back and grasp the fundus and body of the uterus with the hands, making compression and friction until contraction has been secured. The bimanual method of compression (one hand in the vagina, the other upon the abdomen) is very effective.

These means failing, pass the hand into the uterus and remove any clots, shreds of membrane, or pieces of placenta that may remain. Ergotin should be administered hypodermically. The uterus may be stimulated to contract by the application of cold; ice or ice-water may be applied to the abdomen and in the vagina, or in the uterus itself.

If the cold applications fail, and the patient is exhausted, hot water (110°, or as hot as the hand can bear) may be injected into the uterus.

The application of the child at the breast will sometimes, by reflex action, excite uterine contraction.

When these means fail styptic injections should be used; of these Monsel's solution of iron (1 part to 4 or 6 parts of water) may be injected into the uterus or applied directly to the bleeding surface with the ordinary uterine applicator. Tincture of iodine is recommended for the same purpose. In an emergency, vinegar is a good substitute for either.

Hemorrhage arising from laceration of the soft parts may be checked by compression or by application of the styptic solution.

The alarming symptoms which may result from the excessive loss of blood should be counteracted by lowering the head and elevating the lower extremities; ether or brandy should be subcutaneously injected (♏xx. to lx.), or a large dose of laudanum (♏xxx. to lx.) may be given, the dose being repeated if necessary; the extremities should be bandaged, and, in extreme cases, transfusion of blood may be the only means of preserving life.

Under no circumstannes should a vaginal or uterine tampon be used, as the escape of the blood externally would only be prevented, while a fatal concealed hemorrhage might be going on within the uterine cavity.

In secondary *post-partum* hemorrhage a careful vaginal examination should be made, and, if possible, the interior of the uterus should be explored. The cavity should be thoroughly emptied, ergot should be given, and the patient kept perfectly at rest; if the hemorrhage continue, iodine or the styptic solution of iron may be applied to the interior of the uterus.

4. RETENTION OF THE PLACENTA may be due to uterine inertia, to large size of the placenta itself, to separation of its central portion by traction on the cord, to morbid adhesions due to a previous endometritis, or to the so-called "hour-glass contraction" of the uterus.

The immediate danger is *post-partum* hemorrhage; if the placenta has been retained for some time septic poisoning may result.

Treatment.—As long as there is no hemorrhage the natural expulsion of the placenta can be awaited or Crede's method may be employed; some traction may be made on the cord, but as soon as the lower margin of the placenta is within reach it should be grasped and the entire mass drawn gently downward. If, after waiting a considerable time, or if hemorrhage occur and the other means of expression have failed, the fingers and hand should be passed into the uterus, and, the fingers having been gently inserted between the placenta and the uterine wall, the entire mass quickly stripped off and brought down, external pressure upon the abdomen having been continuously made with the other hand.

If there is any "hour-glass contraction" it should be gradually dilated with the fingers, after which the placenta may be removed.

In the artificial separation of the placenta care must be taken that none of it has been left within the uterus, and that all the membranes have been brought away.

The passage of the hand within the uterus increases the risks of septic poisoning. The hand, therefore, should be thoroughly aseptic, and it is recommended that the uterus be washed out afterward with a disinfectant solution.

5. INVERSION OF THE UTERUS is a partial or complete turning inside out of the organ. It may be produced either before or after the expulsion of the placenta, and is of rare occurrence.

Inversion of the uterus is favored by uterine inertia and attachment of the placenta exactly at the fundus, but the immediate causes usually are, pressure upon the fundus or traction on the cord when the uterus is relaxed; sometimes it is due to weight of the placenta, or it may occur spontaneously.

The symptoms of inversion are: hemorrhage due to the inertia, and shock which is evidenced by a small pulse, cold extremities, and vomiting.

The diagnosis is made by vaginal examination, by absence of the uterine tumor above, and by the conjoint manipulation.

Treatment.—The inverted portion should be immediately grasped in the hollow of the hand and pushed gently and firmly upward in the direction of the pelvic axis, counter-pressure being made upon the abdominal walls. If the placenta is attached or only partially adherent, it may be stripped off before the reduction is made; if, however, it is completely adherent and there is no hemorrhage, it may be allowed to remain until the organ is restored to its natural condition.

If contraction of the cervix prevents reduction, and the condition of the patient will allow, an anæsthetic should be given. In some rare cases, after all attempts have failed, spontaneous restoration has occurred.

6. RUPTURES AND LACERATIONS OF THE GENITAL CANAL include rupture of the uterus, lacerations of the cervix, lacerations of the vagina, lacerations of the vulva and perineum.

(*a*) **Rupture of the uterus** is a rare but most dangerous accident of labor; it may take place at any part of the uterus, but is most common at the junction of the cervix with the body. The rupture is usually vertical and located in the anterior or posterior wall; it may involve both the uterus and peritoneum, the uterus alone or the peritoneum alone, or it may extend downward and involve the vagina.

The causes of rupture are: predisposing, exciting.

The *predisposing causes* are alterations of the uterine tissue,—such as are produced by the presence of fibroids, carcinoma, fatty degenerations of the muscular fibres, excessive thinning of the uterine walls, obliteration of the os, rigidity of the cervix, and the changes produced by former labors,—deformed pelvis, large size of the fœtal head, malpresentations, and any condition which produces undue compression or stretching of any part of the uterus.

The *exciting causes* are: blows, falls, injury by instruments, and excessive uterine action such as occurs in contracted pelvis, and after the use of ergot.

Rupture usually occurs suddenly, and is accompanied by great pain in the abdomen, and a feeling that something has given way. The uterine contractions usually cease; vaginal examination reveals hemorrhage and a change in the presentation or position.

If the child has escaped into the peritoneal cavity the form of the abdomen is changed, and the fœtus can be felt beneath the abdominal wall. Symptoms of hemorrhage and collapse soon set in, and the patient usually dies.

Treatment.—Rupture should be prevented by the avoidance of ergot and undue exertion; when pressure and stretching of the uterus have been of considerable duration, interference in the way of artificial delivery is indicated. If rupture has occurred, and the fœtus is still in the uterus, rapid delivery should be effected either with the forceps or by version.

If the entire fœtus or a greater part of it has escaped from the uterus and passed into the peritoneal cavity, the operation of gastrotomy affords the mother the best chance of recovery. This should not be undertaken until she has rallied from the effects of the shock which may be overcome with stimulants.

(*b*) **Lacerations of the cervix** are of very common occurrence. The lacerations are generally lateral, either on one or both sides; they may extend in a vertical direction or be stellate; in rare cases an entire ring of cervical tissue has been detached. These lacerations are the results of rigidity combined with undue expulsive force or of artificial delivery of the child. Premature rupture of the membranes predisposes to laceration, and pressure of the anterior lip of the cervix between the head and pubis may cause it. They may be followed by *post-partum* hemorrhage (primary or secondary), septicæmia, pelvic inflammations, or chronic uterine disease.

Treatment.—The hemorrhage may be checked by the application of ice, by cold or hot water injections, or by the application of Monsel's solution of iron. In severe forms of laceration the immediate application of sutures is recommended.

(*c*) **Lacerations of the vagina** may be mere abrasions of the surface, or they may extend entirely through the wall.

Abrasion and sloughing may result from prolonged pressure of the head, and end in perforation of the wall with the establishment of vesico-vaginal or recto-vaginal fistulæ, or the injury may be produced by instrumental delivery.

Treatment.—Sutures will rarely be required. Hemorrhage may be arrested by cold or heat, by pressure, or by the application of styptics. Cleanliness is an essential part of the treatment.

(*d*) **Lacerations of the vulva and perineum.** The vaginal outlet formed by the insertion of the hymen is almost invariably ruptured in first labors, the tear extending to the base of the hymen and reaching the cellular tissue of the vaginal wall. The lacerations may involve the perineal body and extend up to the sphincter ani, or even through the sphincter into the rectum.

Treatment.—Prophylaxis has been mentioned in connection with the management of normal labor.

Hemorrhage may be arrested by the usual means. If the laceration is slight, rest and cleanliness will suffice; if it is more extensive, the surfaces must be brought together by sutures as soon as the placenta has been removed, and the patient kept in bed with her knees together. The urine should be drawn off with a catheter for a day or two, after which it may be passed while the patient is in the kneeling or knee-and-elbow position. The sutures should be removed in about a week.

7. THROMBUS OF THE VAGINA AND VULVA is an effusion of blood into the cellular tissues; it may occur during pregnancy, but is most common during or immediately following labor.

The hemorrhage may be arterial or venous—generally of the latter origin—and although usually situated in one of the labia it may extend along the vagina to the pelvic cellular tissue. The tumor may become as large in size as a fœtal head.

The conditions favoring thrombus are: Engorgement and distension of the vessels due to pregnancy or to interference with the return of blood by pressure of the head during labor; the violent efforts of the patient.

The symptoms are: Pain of a tearing character; a firm, hard swelling if the effusion has taken place in the external parts.

The tissues are lacerated, and the swelling may become so great as to cause bursting of the skin; fatal hemorrhage may ensue whether the skin has or has not been ruptured.

Thrombus may terminate by absorption if the exudation be slight, by bursting of the skin, or by suppuration.

Treatment.—If thrombus occur during labor the latter should be terminated as quickly as possible, the forceps being applied as soon as the head is within reach. If the tumor is of considerable size or obstructs delivery, it should be freely incised at its most prominent point and the clots turned out, the hemorrhage being controlled by digital pressure and by filling the cavity with cotton saturated in Monsel's solution of iron. If the thrombus is small, or if it has not been detected until after delivery, it may be left alone, as absorption is most likely to occur; if it should suppurate, the abscess must be opened and the wound treated antiseptically.

PART V.

THE PUERPERAL STATE.

CHAPTER I.

PHYSIOLOGY OF CHILDBED.

THE puerperal state includes a period of about six weeks, commencing immediately after labor and continuing until the uterus has undergone the process of involution.

After labor the patient may experience a sense of comfort and repose, but there is usually a temporary condition of exhaustion or nervous depression which may be followed by a chill of greater or less intensity, but of short duration and of no significance.

The *temperature* during labor, and for a short time after, is slightly elevated; it may remain stationary or rise somewhat until lactation is established, but generally commences to decline within the first twenty-four hours. A temporary rise of temperature, occasioned by excitement, constipation, or error of diet, is liable to occur at any time; but unless it continues above 100°, and is associated with rapidity of the pulse, nothing is to be feared.

The *pulse*, which was more rapid during labor, is diminished in frequency, and may even for a time sink below the normal; this slowing of the pulse is a favorable indication, and should be looked for in all cases.

A temporary increase in frequency is of common occurrence.

The *secretions* are generally more active, especially those of the skin and kidneys; on this account, and because of the changes in the pelvic organs and the discharges from the genital canal, the loss in weight during the first week is nine to ten pounds. The bowels are constipated, and there may be retention of urine for a day or two.

After-pains, the irregular painful contractions of the uterus which may commence a short time after the expulsion of the placenta and recur at various intervals during the first four days, are most common in multiparæ, after rapid delivery, or where from any cause uterine inertia exists. They may be excited by applications of the child at the breast, but generally depend on the presence of coagula in the uterus.

Lochia, the discharge from the genital organs especially the uterus during the period of its involution, consists of blood-corpuscles, epithelium, shreds of decidua and membrane, pieces of placenta, pus cells, mucus, and fat. During the first few days it is alkaline in reaction and red in color, consisting of nearly pure blood which is sometimes clotted. Its appearance gradually changes, and at about the fifth or sixth day becomes a pale green; after the eighth or ninth day the reaction is neutral or acid while the discharge becomes muco-purulent, gradually lessening in amount and changing to the normal transparent mucus.

The amount of the discharge varies in different women, but its character and appearances depend on the conditions of the organs, especially the progress of involution or the existence of cervical lacerations.

The odor may become exceedingly offensive on account of retention and putrefaction of coagula, pieces of placenta or shreds of membrane; if such a condition be neglected septic poisoning may result.

The uterus immediately after delivery contracts firmly, and can be felt at the lower part of the abdomen as a hard firm mass about the size of a fœtal head.

The more complete and permanent the contraction the greater the safety and comfort of the patient, and the more rapid and favorable the process of involution.

During the first ten days after delivery the fundus can be felt above the pubis, but after the second week the entire organ should be beneath the pelvic brim. The cervix is soft and patulous for some weeks after delivery. The mucous membrane is covered with a reddish-gray film of blood, fibrin, and remains of decidua, and the open mouths of the sinuses can be detected with their projecting thrombi. The rapid diminution in the size and weight of the organ is due to a fatty degeneration of its muscular fibres.

The vagina remains soft, smooth, and dilated for some days, and is always more lax and less rugose than in nulliparæ.

The secretion of milk is generally established in about forty-eight hours. During the latter months of pregnancy and immediately after labor a fluid called *colostrum* is found in the breasts; having a larger supply of salts than milk it acts as a laxative for the child and assists in carrying off the *meconium*.

The establishment of the lacteal secretion on the second or third day after delivery is often accompanied by constitutional irritation; the breasts become swollen and tender, the pulse is quickened, the temperature elevated, and there may be slight shiverings,—the disturbance being known as "milk fever."

As soon as the secretion has been established these symptoms usually subside.

CHAPTER II.

MANAGEMENT OF CHILDBED.

DURING the lying-in period the three essentials are: *quietness*, *cleanliness*, and *rest*. As soon as the uterus is perfectly contracted and the external parts have been washed in a warm antiseptic solution, the soiled clothing must be removed; after the abdominal bandage has been applied and the patient has had what light nourishment she may require the room should be darkened and all noise or excitement removed that sleep may be induced. After a few hours the patient should be seen and particular attention given to the conditions of the pulse, bladder, and uterus; if there be retention of urine hot fomentations may be cautiously applied over the hypogastrium, but the catheter must be used before a delay of many hours has elapsed. The abdomen should be felt to ascertain that the uterus is not unduly relaxed or distended, and that there is no special tenderness on pressure.

After-pains, if severe should be relieved by opiates, or if the lochia be not over-abundant by external applications of heat. Quinine (gr. x) is recommended when the opiates fail.

The *diet* should consist of easily digestible food, such as milk, eggs, fish, chicken, essence of beef, toast, tea, etc.; after the third or fourth day when the bowels have been evacuated and lactation is established, the ordinary diet may be resumed with safety, but the patient being confined to bed does not require the same amount of solid food as when she is up.

On the third or fourth day it is customary to have an action of the bowels, either by an enema of soap and water, a dose of castor-oil, or, if the secretion of milk is over-abundant, by a saline laxative. In the majority of cases the pulv. glycyrrhiza comp. is an efficient and agreeable remedy; aloes in small doses is recommended when the patient has hemorrhoids.

Cleanliness in every particular is absolutely necessary. The room should be warm, but the air must be kept fresh and pure. The napkins which are applied to the vulva to receive the flow should be frequently changed. The external parts should be washed at frequent intervals with a warm antiseptic solution, and vaginal injections of a similar warm solution are generally used. All soiled clothing must be immediately removed from the chamber. If the lochia become offensive, injections of Labarraque's solution (liquor sodæ chlorinatæ) (diluted) or carbolic acid (diluted) should be frequently used until the unpleasant odor has disappeared; these failing, the interior of the uterus must be cleansed, either by injections or by the use of the dull curette when the finger cannot be introduced.

Rest in bed for a considerable time is an important part of the management; the number of days the patient should remain in bed depends on her condition, especially on the progress of involution; but the longer she retains the recumbent position the better.

If everything be favorable, after nine or ten days she may be permitted to sit up a little, but should avoid walking or any exertion for at least three or four weeks. During convalescence mild tonics and change of air are often serviceable.

CHAPTER III.

CONDITION AND CARE OF THE INFANT.

A HEALTHY child, as has been said, begins to breathe and to cry almost immediately after its expulsion. In such cases, as soon as the pulsations of the cord have ceased or have become feeble, the ligature is applied and the child given to the nurse to be washed and dressed.

In order to facilitate the removal of the unctuous material (vernix caseosa) with which it is covered, the body should be anointed with some oily substance such as lard, sweet oil, vaseline, etc., after which it may be carefully washed in warm water, care being taken that the eyes are thoroughly cleansed and that the child is not too long exposed. In cool weather it is safer to avoid the use of water in the first cleansing of the child as it is liable to take cold; having been well anointed the secretions can be readily removed by soft cloths.

The dressing for the cord usually consists of a piece of linen (sometimes charred) with a hole in its centre through which the cord is passed, the linen being then folded over the cord.

Absorbent cotton has been recommended for covering the cord, and is probably the best dressing that can be applied.

The dressing should be renewed from day to day until the cord has withered and separated. This generally occurs within a week, and a small pad of soft linen is then placed over the umbilicus.

The child's abdomen should be supported by a flannel bandage which will also hold the dressing of the cord in place, care being taken that the bandage is not too tight. The child's clothing should be warm but light.

Bathing of the entire body in tepid water is necessary at least once daily.

The vernix caseosa, as has been said, is an unctuous material consisting of epithelium and sebaceous secretion which covers the skin of the child at birth.

The meconium is a black fluid consisting of bile and mucous which is discharged from the bowels of the child during the first few days after its birth.

The caput succedaneum is an œdematous swelling which forms on the head; it is produced by effusion from obstruction of the venous circulation caused by the pressure to which the head has been subjected. The size and situation of the swelling vary with the duration of labor and the position of the head.

It usually disappears in a few days, as do other alterations in the form of the cranium, and it is only when suppuration has occurred that puncture or incision is necessary.

The breasts of new-born children, both male and female, are sometimes enlarged, and on pressure will yield a milky fluid; in almost all cases the secretion disappears in a few days, but if the breasts be irritated, suppuration may result.

Asphyxia Neonatorum.—In many cases of prolonged second stage of labor, the head having been subjected to long-continued pressure, or the utero-placental circulation having been interfered with, the child may be apparently dead when born.

If its pulsations have ceased the cord should be immediately tied and the child removed from the mother by cutting the cord beyond where the ligature has been applied; but when the face is *livid* it is sometimes beneficial to allow a few drops of blood to escape from the previously severed cord before applying the ligature. The mucus having been cleared from its mouth by the fingers, respiration should be stimulated by sharp slaps upon the thorax with the hand or a wet towel, by quickly rubbing the body with brandy poured upon the hands, by sudden and alternate applications of heat and cold, or by carrying on artificial respiration by movements of the arms and chest. These means failing, a flexible catheter should be passed into the glottis when air can be gently blown into the lungs and expelled by compression of the thorax. The fluids which fill the trachea will flow through the catheter, or may be sucked up into the instrument and thus removed from the lungs. The same effect may be produced by placing the hand over the child's nostrils and blowing directly into its mouth, but the liability is that the stomach will be inflated instead of the lungs. As long as the heart continues to act there is hope for recovery, and artificial respiration should be persevered with until the natural respiratory movements commence.

Jaundice commonly occurs a few days after birth, and usually disappears spontaneously. Premature or weak children are especially liable to the true variety, but in the majority of cases the jaundiced hue is due to great hyperæmia of the skin followed by desquamation; in such cases there is no discoloration of the sclerotic.

CHAPTER IV.

LACTATION.

AFTER the mother has rested a few hours the child may be put to the breast; such application favors uterine contraction, and at the same time the temporary secretion known as *colostrum* by its purgative properties induces a discharge of the *meconium* with which the bowels are loaded.

Previous to the third day, or before full establishment of the lacteal secretion, the child should take the breast only once or twice daily; afterward it must be applied regularly every two or three hours. At night the intervals between nursing should be gradually lengthened.

The child usually requires no nourishment before it can be supplied by the mother; if any is given meanwhile it should be simply sweetened water.

When the mother's health permits, and unless there is some contra-indication, such as a marked strumous diathesis, syphilis, phthisis, great debility, or excessively sore nipples, the child should be nursed by her at least for a few months, as it favors the proper involution of the uterus and gives the child a better chance of living.

If the mother cannot or will not nurse the child, a *wet nurse* should, if possible, be procured. She should be strong and healthy, between the ages of twenty and thirty-five years, and free from all traces of constitutional disease; the breasts should be in a healthy condition, the nipples well formed and free from cracks or erosions;

the milk should flow easily, and should, if possible, be carefully examined; the nurse's child should be near the same age as the child to be suckled, plump, well nourished, and free from all blemishes. The diet of the nurse should be plain, nutritious, and abundant.

If the mother is unable to nurse the child, and a wet nurse cannot be procured, artificial or hand-feeding will be necessary; the mortality of such children is much greater on account of the unsuitable food that is so often used.

The substitute most suitable to all cases is cow's milk; it differs from human milk in containing less water and sugar and more casein, and must, therefore, be diluted with water and sweetened before use. Dilution is necessary only during the first two or three months (about one part water to two parts milk); afterward pure milk warmed and sweetened may be given. In order to prevent the coagulation of the casein, lime-water should be added to the milk. In hot weather it is safer to have the milk boiled and then prepared in the usual way.

When it is impossible to get good cow's milk, or when the latter disagrees with the child, condensed milk should be tried. The food must be prepared fresh for every meal, and given in moderate quantity at regular intervals; the bottle must be scalded after each use, and the nipple, which should be used in preference to a tube, must be kept perfectly clean.

During the first three months purely starchy food, such as corn flour, arrowroot, etc., must be avoided, as the child cannot digest it. For the majority of children before the sixth month milk should be the only food, but after that time the child may have occasionally chicken or beef broth with bread crumbs, oatmeal, and if necessary, one of the various infants' foods may be commenced.

CHAPTER V.

PATHOLOGY OF CHILDBED.

The diseases and accidents which are liable to occur in connection with the *lying-in period* are as follows:—

Disorders of lactation; puerperal septicæmia; pelvic cellulitis and pelvic peritonitis; puerperal thrombosis and embolism; phlegmasia alba dolens; puerperal insanity.

I. DISORDERS OF LACTATION.—These are numerous and always demand careful attention as well as careful treatment.

It is sometimes necessary on account of death of the child, inability to nurse, or a desire to wean it, to use means for getting rid of the milk as soon as possible; in order to accomplish this the diet should be restricted, a daily saline laxative given, and the breasts covered with a layer of lint or cotton-wool soaked in a spirit lotion, over which oiled silk is placed. Among the remedies recommended for this purpose are camphor, atropia or belladonna, and iodide of potassium internally.

Generally all local treatment, except that which is for the patient's comfort, is unnecessary, for the secretion stops when the milk is no longer required.

(*a*) **Excess of milk** accompanied by constant dribbling, known as galactorrhœa, is of common occurrence during the first weeks after delivery; it is especially liable to occur in women of delicate constitutions.

Whenever the mother's health is being affected by the drain upon her system the child should no longer be allowed to nurse, especially as the milk sooner or later must disagree with it.

The above-mentioned means for stopping the secretion may then be applied, and in addition the breasts should be compressed by strapping.

(*b*) **Deficiency of milk** is usually the result of defective nutrition. The requirements for the abundant secretion of milk are as follows: A liberal and nutritious diet; regular rest; moderate exercise in the open air; freedom from anxiety; and, in certain cases, less frequent applications of the child to the breast, cow's milk being occasionally substituted.

(*c*) **Sore nipples** may be caused by aphthous conditions of the child's mouth, but are most likely to occur when the skin is thin and tender and lacking in sebaceous secretion, or when the nipples are retracted and difficult for the child to seize, as is often the case in primiparæ.

The two varieties of sore nipple are:—

Abrasions, which may become small ulcers; *cracks* or *fissures*, which are generally found at or near the base of the nipple.

In either condition the suffering may be intense when the child suckles, and the inflammation may extend to the mammary gland.

Treatment.—It is recommended to prepare the nipples for nursing in the latter months of pregnancy by bathing them with spirituous or astringent lotions. When nursing has commenced, and the child has been removed from the breast, the nipples should be washed and thoroughly dried. Cocoa-butter or mutton suet may be applied, and a shield worn as long as the mother is in the recumbent position. When the nipple becomes sore and painful one or more of the following remedies may be employed: glycerite of tannin; weak solutions of nitrate of silver; the mitigated stick; flexible collodion; compound tincture of benzoin; nitrate of lead (gr. x) in glycerine (f℥j); tincture of catechu; a mixture of sulphurous acid (f℥ss), glycerite of tannin (f℥ss), water (f℥j). Before putting the child to the breast the lotion should be washed off. If the child can be induced to suck through a nipple shield much relief will be temporarily afforded.

(*d*) **Inflammation of the breasts** may result from engorgement of the lacteal tubes, exposure to cold, injury, mental emotions, or, as is frequently the case, from a sore nipple by spread of the inflammation. It may involve only one or two lobules and be comparatively superficial, or may affect the entire breast. The breast is hard, tender, and enlarged; there may be swelling of the axillary glands, and fever is always present.

The inflammation may terminate in resolution or in suppuration with the formation of one or more abscesses which may lead to the formation of fistulæ.

Suppuration is generally ushered in with rigors; the skin over a particular portion of the breast becomes red and tense, and the abscess eventually bursts. The abscess usually points near the nipple; but when suppuration is deep seated the pus may burrow extensively beneath the glandular structure of the breast.

Treatment.—Prophylaxis includes the treatment of sore nipples and guarding the breast from injuries of various kinds; engorgement of the lacteal tubes should be prevented by regular nursing, removal of the excessive secretion, gentle hand friction, and the application of heat.

When the inflammation has commenced resolution should be favored by absolute rest (removal of the child), salines, aconite, and quinine. Pain may be relieved by giving opiates and applying hot fomentations, light poultices, belladonna, or a solution of atropia, the breast being supported by a bandage.

The local application of ice has been highly recommended. When suppuration has taken place the abscess should be opened as soon as possible and the pus evacuated, the incision being made in a line radiating from the nipple to avoid severing the milk-ducts. The opening thus made should be dressed antiseptically to avoid long-continued suppuration.

When sinuses and fistulæ result the breast should be strapped and stimulating lotions or injections used, the secretion of milk being checked as soon as possible; sometimes it will be necessary to lay the sinuses open.

2. PUERPERAL SEPTICÆMIA, called "puerperal fever," is an acute contagious disease attacking women in childbed but identical with ordinary septicæmia. There are numerous theories regarding the nature and origin of the disease, among them are the following:—

That it is a local inflammation producing secondary constitutional effects;

That it is an essentially zymotic fever, peculiar to and attacking only puerperal women;

That it is produced by the absorption of septic matter into the system, and is, therefore, identical with surgical septicæmia.

The latter theory is the one generally accepted at the present time.

The *cause* of puerperal fever is septic poison in the system; this poison may be produced within the body of the patient (autogenetic), or it may be conveyed to the patient from without (heterogenetic).

The sources of self-infection (autogenetic) are decomposition of the tissues of the mother or of matter retained in the uterus or vagina that ought to have been expelled, such as coagula and small portions of membrane or placenta which have putrefied from the access of air. Some authorities claim that the conditions named are not the sources of infection, but that they furnish a favorable soil for the development of the poison.

The sources of heterogenetic infection are probably any decomposing organic matter, some forms being more virulent than others.

The poison may be carried from one patient to another, from the *post-mortem* or dissecting-room, or may be produced by the poison of erysipelas, scarlatina, and other zymotic diseases. It may be conveyed by the hands of the accoucheur, by the nurse, by sponges, etc., or by the atmosphere.

The absorption of septic matter may occur at the placental site or in wounds of the cervix, vagina, and perineum; in some cases the absorption is believed to have taken place through the intact vaginal or cervical mucous membrane.

The *pathology* of the disease includes lesions which may be slight or may involve a large portion of the body; these are as follows:—

Inflammation of the vaginal and uterine mucous membranes, small wounds of these parts being generally covered with diphtheritic patches;

Inflammation of the uterine parenchyma, and of the connective tissue adjacent to it;

Inflammation of the ovaries;

Inflammation of the peritoneum, which may involve only that found within the pelvis, or be general;

Inflammation of the other serous membranes (pleura, pericardium, meninges, joints);

Inflammation of the lymphatic glands;

Pyæmia with the formation of abscesses in various parts of the body.

The *symptoms* vary greatly in different cases. The disease generally commences within the first five days after delivery, the onset being most common on the third. A sudden rise of temperature (102° or more) accompanied by rigors and quickening of the pulse are often the first symptoms which attract notice; in some cases the temperature may quickly rise to 103° or 104°, and the pulse to 140. There is tenderness over the uterus, but little or no pain; the spleen is enlarged and tender; intelligence is unimpaired unless the temperature has remained high when there may be delirium.

The headache is severe; the tongue is coated, and becomes eventually dry and brown; the teeth are covered with sordes; the breathing is hurried, and the breath has a heavy sweetish odor. The abdomen is distended and tympanitic; vomiting and diarrhœa are of frequent occurrence, the latter being sometimes profuse and uncontrollable. The lochia are generally suppressed or altered in character, and the odor may be highly offensive; the [illegible] milk is often arrested.

The complications—such as peritonitis, pleurisy, pneumonia, pericarditis, and nephritis—are accompanied by their own symptoms, and variously modify the course of the disease.

Death is the result of the complications, or the patient may pass into a typhoid condition with rapid or intermittent pulse, marked delirium, great tympanitis, and die of exhaustion within a week.

Treatment.—Prophylaxis is the most important part of the treatment; it includes precautions taken by the patient, accoucheur, and nurse before, during, and after labor.

The physician should not take charge of a case of labor whilst he is in attendance on a case of puerperal fever, infectious disease, or is engaged in the dissecting-room; if there be a necessity for his attendance he must first take a full bath, make a complete change of clothing, and, before examining the patient, should wash his hands and arms in an antiseptic solution. In order to guard against the sources of self-infection all clots, shreds of membrane, and pieces of placenta should be removed, and the uterus firmly contracted.

The nurse must be scrupulously clean, and in washing and syringing the patient should use antiseptic solutions.

When the disease exists further absorption of septic matter should be prevented by vaginal, and, in some cases, by intra-uterine injections of antiseptic solutions.

Intra-uterine injections should be used with caution, a fountain syringe being employed for the purpose on account of its greater safety.

The usual result of the repeated injections is a marked lowering of the temperature; if, however, the fever still continue and there be any foreign substance within the uterus, the fingers, forceps, or dull curette must be used to remove it.

The temperature may be reduced by the cold bath, the wet sheet, applications of ice to the abdomen, or frequent sponging of the skin with cool water; when there is much abdominal tenderness or tympanitis, flannel cloths wrung out of hot water and sprinkled with turpentine should be substituted for the cold applications.

The medicines that may be employed for this purpose are: Quinine, salicylic acid, salicylate of sodium, antipyrin, alcohol, and, if the pulse is not weak, aconite. Opium is frequently indicated to relieve pain or restlessness, or to assist in checking the diarrhœa.

Nourishment must be given frequently in the form of easily digestible food to which stimulants may be added as indicated.

The complications which so often arise must be treated on general principles.

3. PELVIC CELLULITIS AND PELVIC PERITONITIS.—Pelvic cellulitis is an inflammation affecting chiefly the connective tissue surrounding the generative organs contained within the pelvis; pelvic peritonitis is an inflammation attacking that portion of the peritoneum which covers the pelvic viscera. These diseases which are frequently associated are not limited to the puerperal state, and when they do occur in connection with it, may or may not be accompanied by general septicæmia.

They are produced by extension of inflammation from the uterus, ovaries, or Fallopian tubes; by irritating discharges from the tubes or ovaries; or by mechanical injury.

Cellulitis rarely exists without peritonitis.

The *symptoms* of these diseases may show themselves within a few days after delivery or may come on after a period of several weeks. Those which first attract attention are a rigor or chilliness, and the accompanying pain in the lower part of the abdomen. The pain may be slight or may be excessive with occasional intermissions. The tenderness on pressure is marked when there is peritonitis, less so when there is uncomplicated cellulitis.

The temperature is often very high (104°), but generally there are marked remissions.

The pulse varies from 100 to 120. Nausea and vomiting accompany the peritoneal inflammation.

The vagina is found hot, swollen, and tender, and a thickness or induration may be detected near the uterus; if there has been much exudation the uterus is displaced and more or less fixed.

The inflammation may end in resolution or suppuration; in the former case the acute symptoms subside, the tenderness disappears, the swelling decreases and may be absorbed, or permanent adhesions with fixation and displacement of the uterus may result; if suppuration occur the acute symptoms continue and are accompanied by the characteristic rigors and exacerbations of temperature until the abscess has formed and opened either through the abdominal wall or into the rectum, bladder, vagina, or, as sometimes happens, into the peritoneal cavity when general peritonitis results.

Suppuration is more likely to occur in cellulitis than in peritonitis, and is said to be rare in either case except when associated with puerperal fever.

The *prognosis* for recovery is good, but the liability to general peritonitis, exhausting suppuration, and permanent alteration of structure of the parts makes it less favorable.

Treatment.—The most important points are: Relief of pain; absolute rest.

For the relief of pain opiates should be given repeatedly in large doses, and warmth and moisture applied in the form of poultices to the lower part of the abdomen.

Local abstraction of blood by leeching is recommended in the early stage of the disease.

For the pyrexia quinine is useful and may be given with the opiates. The constipation thus produced can be overcome by enemata or small doses of castor-oil.

Small doses of tartar emetic and calomel may be combined with morphia and given during the acute stage; when this stage is passed the daily local application of tincture of iodine or some other form of counter-irritation should be employed.

When the abscess has formed the aspirator should be used, or if it is superficial a free incision may be made and antiseptic treatment instituted.

During all of this time absolute rest in bed is necessary; the diet should be abundant, simple, and nutritious; stimulants may be necessary; tonics are indicated and generally beneficial.

4. PUERPERAL THROMBOSIS AND EMBOLISM.

THROMBOSIS is a partial or complete blocking of a bloodvessel by coagulation of the blood.

EMBOLISM is an obstruction due to the impaction of a separated portion of a thrombus formed elsewhere.

These obstructions are liable to occur in arteries or veins, but it is the pulmonary artery that is most commonly affected during the puerperal state.

The *causes* of coagulation are: Excess of fibrin in the blood; a stagnant or arrested circulation; mechanical obstruction.

Embolism, as has been said, is produced by the carrying of all or a portion of the clot to the right side of the heart, whence it is sent to the pulmonary artery.

Obstruction of the general arterial system may be due to alteration of the blood or to detachment of vegetations on the cardiac valves.

The *symptoms* of thrombosis and embolism are almost identical, and usually come on suddenly. Intense dyspnœa, giving rise to violent efforts to get more air, sets in and continues until the patient dies of asphyxia. The face is pale or cyanosed; the pulse is feeble and at length imperceptible; a systolic murmur may be heard over the pulmonary artery; the intelligence is unimpaired almost to the last.

Death generally results from asphyxia or syncope, but if the obstruction be only partial, if sufficient blood may pass to keep the patient alive, and a sudden supply of oxygenated blood be not demanded by any undue exertion, the patient may live until the obstruction is removed.

Obstruction of the general arterial system causes symptoms which vary with the arteries affected and the amount of the obstruction.

Treatment.—The indications for treatment are: Absolute rest in bed, no movement whatever being allowed; administration of stimulants. If the patient survive the onset of the attack ammonia and other alkalies have been recommended to prevent further coagulation and to favor absorption of the clot already formed.

5. PHLEGMASIA ALBA DOLENS.—A swelling of one or both legs occurring after labor, but rarely before the second week. The causes of the swelling are:—

Thrombosis of the uterine veins, which may extend to the iliac and femoral veins, or thrombosis of the femoral vein alone;

Phlebitis resulting in thrombosis.

Phlegmasia dolens is a frequent complication of septicæmia, and on this account has been thought to be always produced by that disease or to be dependent on it.

The *symptoms* are: Acute pain extending the length of the limb and along the vein; swelling of the limb, commencing within the first twenty-four hours after the onset of the pain; restlessness; elevation of temperature; rapidity of the pulse.

The swelling usually begins in the groin and extends downward; it may be limited to the thigh or may involve the entire limb. The part of the limb affected is hard, tense, of a shiny white color, and unyielding on pressure except at the onset or toward the termination of the affection.

The left leg is most frequently attacked, but the swelling may extend to the other limb.

After the swelling has set in the pain is not so severe, but it does not cease altogether for a week or two when the acute symptoms usually subside. The swelling gradually diminishes, but absorption may not be completed for several months. Too early use of the limb may cause a recurrence of the swelling; in rare cases suppuration takes place.

The greatest danger is, detachment of a portion of the thrombus and possibly fatal pulmonary obstruction.

Treatment.—The limb should be kept at perfect rest in the horizontal position in order to guard against pulmonary embolism; pain may be relieved by the constant application of heat and moisture in the form of poultices or turpentine stupes, also, by the frequent use of anodynes, liniments, and opiates given internally; the diet must be light, but nutritious and abundant; stimulants may be required.

The remedies for internal use are: Nitrate of potash; chlorate of potash; carbonate of ammonia; iron; quinine; and tonics.

After the acute symptoms and all pain have subsided the limb should be firmly and evenly bandaged from below upward; but until the swelling has commenced to disappear it should remain elevated and at rest.

6. PUERPERAL INSANITY.—Insanity may come on during pregnancy, during labor, or during the puerperal state and the period of lactation.

Insanity coming on after labor is the most common variety. There are two forms of the disorder: acute mania, which usually comes on within the first week or two after delivery; melancholia, which usually commences later, but during some part of the period of lactation.

The *causes* are: Heredity; moral influences; physical influences. Exhaustion produced by hemorrhage, albuminuria, septic matter in the blood or prolonged lactation predispose to it.

The *prognosis* should be guarded; it is said, however, that most of the patients recover. In delirium of the first few days after delivery death may occur or the disease may terminate in permanent mental derangement.

Most of the cases of insanity of lactation recover after the child has been weaned.

Treatment.—Acute mania requires abundant nourishment and sleep.

Solid food should be given if possible, but if she refuse to take it, liquids must be forcibly introduced; the bowels should be regulated by occasional aperients; stimulants should be withheld until exhaustion necessitates their use.

Sleep must be induced by the use of chloral by the mouth or rectum, bromides, warm baths, or the wet pack.

The room should be kept cool, darkened, and quiet.

Cases of chronic melancholia are best treated in an asylum.

PART VI.

OBSTETRIC OPERATIONS.

CHAPTER I.

INDUCTION OF ABORTION AND PREMATURE LABOR.

THE induction of abortion is an operation not designed to save the child, but performed in the interest of the mother; the induction of premature labor is a conservative operation performed in the interests of both mother and child.

Abortion may be brought on at any time before the period of viability (seventh month).

The induction of premature labor should not be undertaken until after that period.

Before undertaking either of the operations a consultation must invariably be held.

I. ARTIFICIAL ABORTION.—The induction of abortion is justifiable when one or more of the following conditions exist:—

Such obstruction of the birth canal that the delivery of a living child cannot be effected; disease of the mother, induced or aggravated to such an extent by the pregnant condition that her life is endangered; retroversion, retroflexion, or procidentia, which cannot be replaced; disease or death of the embryo or fœtus.

The *mode of operating* varies according to the time of the operation. During the early months a sound or metallic bougie may be passed within the uterus so that the internal os is slightly dilated and partial detachment of the membranes effected, rupture of the ovum being avoided if possible. If this fails after several daily repetitions, the cervix may be dilated with a tent which generally gives rise to uterine action. These means failing, the finger may be passed through the dilated cervix and the attachments broken up, or the ovum may be punctured with a sound.

Every effort should be made to bring the ovum away intact, and on this account the earlier the abortion is induced the more favorable the termination is likely to be. In the latter months it is generally better to puncture the membranes at once, as the ovum is not likely to be expelled intact; for this purpose a narrow pointed uterine sound may be used. Various drugs, electricity, and intra-uterine injections have been employed, but are more dangerous and less effective than the other means.

2. PREMATURE LABOR.—The induction of premature labor is justifiable when one or more of the following conditions exist:—

Pelvic contraction or tumors; diseases endangering the mother's life, such as uterine hemorrhage, eclampsia, obstinate vomiting, etc.; habitual death of the fœtus before full term; or large size of the fœtal head, which may be indicated by the histories of previous pregnancies.

The *methods of operating* are numerous and generally effective. The following are the means that may be employed:—

Vaginal douches of hot or cold water, and vaginal tampons;

Artificial dilatation of the os with hydrostatic dilators;

Introduction of a flexible bougie into the uterus between the membranes and the uterine wall, the bougie remaining *in situ* until labor comes on;

Puncture of the membranes, when the operation is not performed in the interest of the child;

Intra-uterine injections of tar-water or warm water, and the introduction of carbonic acid gas into the vagina—each of these methods having been abandoned as unsafe;

Stimulation of the uterus by friction or electricity;

Ergot and numerous other drugs, none of which ought to be used.

In ordinary cases the best method is the introduction of a flexible bougie into the uterus; in connection with this the vaginal douches may be employed, but, if there is a necessity for haste in the later stage, dilatation may be more rapidly effected by the use of the hydrostatic dilator of Barnes. The most rapid method from the first is puncture of the membranes and insertion of a tent, the effect of the latter being continued until the hydrostatic dilator can be used.

CHAPTER II.

USE OF THE FORCEPS.

THE obstetric forceps consists of two separate blades curved to fit the child's head and, in most of the modern instruments, to correspond with the axis of the pelvis.

There are two varieties of forceps—the *short* and the

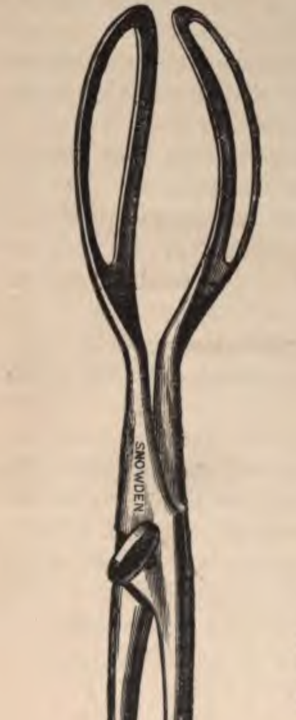

FIG. 34.—Wallace forceps.

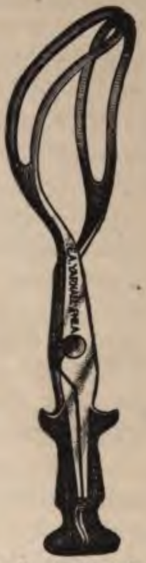

FIG. 35.—Parvin-Davis forceps.

long—but of each of these varieties there are numerous modifications.

Straight forceps, curved only to fit the child's head, and without the pelvic curve, were made short and long; the former could be used only when the head was near the perineum, while the latter would not allow the head to be grasped in the axis of the brim, nor could traction be made in the direction of that axis.

Since the invention and addition of the pelvic curve the straight instrument has been almost entirely unused, except for rotation of the head which is sometimes necessary in occipito-posterior positions. (See page 109.)

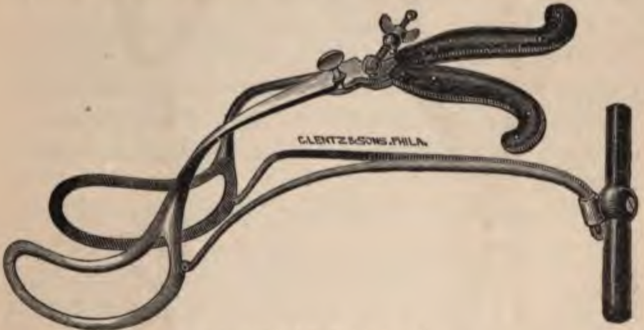

FIG. 36.—Tarnier's forceps.

Simpson's "axis-traction" forceps and Tarnier's forceps have supplementary handles attached to the blades near the lower margins of the fenestræ; traction being made by this handle and not by the others less force is required, the blades are not likely to slip, rotation of the head is not interfered with, and the direction of the traction is in the axis of the pelvis.

Good forceps should be smooth, stiff, and strong with moderately long handles; the cranial curve should be of medium sharpness, and the pelvic curve not more than 30 or 35°; the tips of the blades should be one-half to one inch apart when the handles are closed; the outside measurement across the blades at the widest part should not be greater than three and three-eighth inches.

The *action* of the forceps is threefold: as a *tractor;* as a *lever;* as a *compressor.* The chief action, however, is as a tractor. It acts as a lever when a firm hold is had on the head and when slight oscillatory movements are made, as is necessary in some cases of impaction of the head. It acts as a compressor, but this action is generally not considered desirable.

In addition a *dynamic action* has been claimed for the instrument; it occasionally happens that the introduction of the blades excites increased uterine action through the reflex irritation induced by the presence of a foreign body in the vagina. This action can never be relied on.

The *application of the blades* and the *use of the instrument* is an easy and safe operation when the head is low in the pelvis; when the head is situated at or above the brim of the pelvis the operation is more difficult, and at the same time more dangerous.

The *indications* for the use of the forceps are:—

Cases where the ordinary forces of labor are insufficient to overcome the obstacles to delivery, as in narrowing or partial obstruction of the birth canal, uterine inertia, large fœtal head, malpositions, etc.;

Cases where speedy delivery is demanded in the interest of either mother or child, as in eclampsia, exhaustion, prolapse of the cord, hemorrhage, etc.;

Cases where the head is engaged in the pelvis, and there has been no advance for some time, the "rebound" during the intervals of the diminishing pains having ceased.

The *conditions* necessary for the use of the forceps are:—

Rupture of the membranes;

Complete dilatation of the os and retraction of the cervix;

Knowledge of the position of the presenting part;

Emptiness of the bladder and bowels.

The rule was that the blades should be applied to the head only, whether it come first or last, and whether the position be vertex or face; they have been, however, in some cases successfully applied to the pelvis when that part presented.

In rare cases the blades may be passed within the uterus before there has been complete dilatation and retraction of the cervix for the purpose of bringing the head into the pelvis, but the danger of cervical laceration is very great.

The use of anæsthetics in application of the forceps is generally unnecessary except in the high operation.

The patient should lie on her left side and be brought to the edge of the bed with the nates parallel to it, the body lying across the bed and nearly at right angles to the hips.

In a difficult case she may be placed on her back in the lithotomy position at the edge of the bed; in this position, however, there is not only more exposure but greater risks to the perineum.

The blades should, as a rule, be applied to the sides of the pelvis and not invariably to the sides of the head as was formerly taught.

The *operation* includes three acts: Introduction of the blades; locking; extraction.

Introduction.—This part of the operation must be done during the intervals between the pains. The blades having been thoroughly cleansed, warmed, and lubricated, on account of the arrangement of the lock, the lower one—when the patient lies on her left side—should be introduced first.

This blade (which always passes to the left side of the mother's pelvis) is taken in the left hand and gently passed in the axis of the pelvis along the palmar surface of the right, which has been previously introduced into the vagina, until its point rests just under the tips of the fingers by which the blade is guided into position on the head. At first the handle should be raised and directed somewhat forward, but as the blade passes up the handle must be carried backward.

In pushing the blade into position on the head no force should be used, and the fingers of the right hand, still within the vagina, should protect the cervix from injury as the blade is being guided into its position.

If any obstruction be felt the blade must be partially withdrawn, and gentle efforts continued until it passes readily.

When fully inserted the handle is drawn back toward the perineum and held there by an assistant until the second blade has been taken by the right hand and introduced into the right side of the pelvis; being guided by the palmar surfaces of the fingers of the left hand the blade passes to the other side of the child's head.

In some cases, especially second positions of the vertex, the second or right blade of the instrument commonly used cannot be introduced after the first or left blade is in position; in order to overcome this difficulty by permitting either blade to be applied before the other, which is not possible in other instruments on account of the crossing of the handles and arrangement of the lock, an instrument with parallel handles has been devised by Prof. William S. Stewart, of Philadelphia.

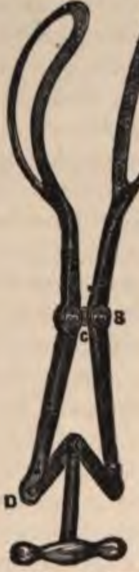

FIG. 37.—William S. Stewart's forceps.

In addition to this advantage the instrument has the following merits which have been proved by experience in the use of it:—

Impossibility of their slipping if the blades have been properly applied;

Moderate and even compression, the degree of compression being regulated by the amount of resistance;

Greater facility for making traction.

Locking.—When the introduction has been effected the right handle of the instrument rests upon the left one, and if the blades have been properly applied there is usually no difficulty in locking them. If, however, this cannot be done by gentle movements, one or both blades must be partially or entirely withdrawn and again introduced.

Care is to be taken in locking that hairs or folds of skin are not caught in the lock.

Traction.—When the locking has been effected, and before traction is made, the finger should be introduced to make sure that the blades have been properly applied to the head, and that there is no danger of their slipping.

Traction must be made in the direction of that part of the pelvic axis in which the head lies; when the head is high, downward and backward; when it has reached the lower part of the pelvis, downward and forward until finally, as the head emerges, the handles are carried up toward the abdomen.

Traction should be made only during the pains; if the pains have ceased, or occur at long intervals, the uterus should be stimulated by external friction, traction being meanwhile made regularly at intervals of a few minutes.

It should be steady—oscillatory movements being justifiable only in rare cases where the head does not advance. Rotation of the head generally occurs independently of the forceps if their hold is occasionally relaxed.

Removal of the forceps when the head has been brought to the perineum, and before it passes through the vulvar orifice, is recommended by some authorities;

others retain the hold with the instrument until the head is delivered that its exit may be retarded until the vulvar orifice is sufficiently dilated.

Vectis.—The vectis consists of a handle and single blade having a cranial but no pelvic curve. Its action is that of a tractor and lever, but since the introduction of the forceps its use has been almost abandoned.

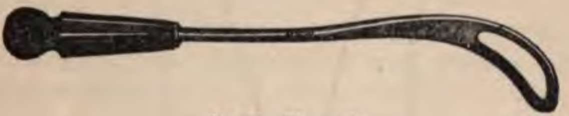

FIG. 38.—The vectis.

It may be used, however, with advantage in correcting malpositions of the head, especially cases of occipito-posterior presentations. When the head is in the lower part of the pelvis, and the pains have not entirely ceased, it can be used as a substitute for the short forceps; but in all cases, on account of the frequent applications to the different parts of the head and the manner in which the instrument must be used, there is great risk of injuring the maternal tissues.

Fillet.—The fillet, one of the oldest of obstetric instruments, consists, as it is now made, of a slip of whalebone fixed into a handle composed of two separate halves which join into one.

By slipping it over the occiput or face and making traction malpositions may be corrected or the head may be brought down. It can be used as a substitute for the vectis, but in most cases the forceps should have the preference.

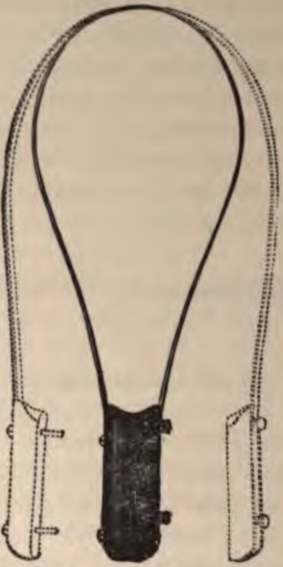

FIG. 39.—The fillet.

CHAPTER III.

VERSION.

A TURNING of the fœtus by which the presentation is changed. The success of the operation depends on the mobility of the fœtus *in utero*. The risks and difficulties of the operation are less if the amniotic liquor is present or has only recently escaped.

If the uterus is tightly contracted on the fœtus, attempts at version may be followed by rupture of the organ.

Before undertaking the operation the bladder and rectum must be emptied.

The *indications* for the operation are conditions imperiling the life of either mother or child,—such as transverse presentations, hemorrhage, certain cases of contracted pelvis and of prolapse of the cord.

The *methods* of performing version are three, viz:—

External method, effected by external manipulation only;

Internal method, effected by the hand introduced within the uterus, the external hand being used only to steady the uterus;

Combined or bi-polar method, in which one hand is used in the vagina, while the other assists in moving the fœtus by pressure through the abdomen.

The *varieties* of version are two: Cephalic; podalic.

I. CEPHALIC VERSION.—This variety of turning, although the first to be introduced, was not used with much advantage before the invention and use of the obstetric forceps; since their introduction cephalic version has been more or less restricted on account of the many favorable conditions necessary to its performance. It may be performed by the *external method*, with both hands upon the abdomen, or by the *combined* or *bi-polar method*.

(*a*) **External method.** The operation must be performed while the fœtus is very movable, therefore before or shortly after rupture of the membranes. It is indicated in the latter part of pregnancy or at the commencement of labor to correct malpresentations, especially transverse or oblique positions of the fœtus.

The positions of the head and breech having been discovered by use of the usual methods of diagnosis, and a change of presentation found to be indicated, the operation may be commenced.

The patient should lie on her back; the operator standing at her right side grasps the fœtal head with his right hand, while the left is applied to the other end of the body. The head and breech are then pushed in opposite directions until the head is above the brim of the pelvis where it must be held, until engaged, by the patient lying on her side, by the hand, or, by means of pads placed on the abdomen at the breech and head and held in position by a bandage; if labor has commenced the membranes should be ruptured so that the head may be retained in its position by the uterine contractions; the forceps may be applied as soon as their use is indicated.

(*b*) **Combined method** (*bi-polar*). In the majority of cases labor has been a considerable time in progress before the operation of turning is undertaken; in these cases the combined method—with one hand internal and the other external—must be employed.

The presentation being that of the shoulder, the right or left hand is passed into the vagina and the other placed upon the abdomen; the shoulder is then pushed gradually in the direction of the feet, while the external hand presses the head toward the brim where it may be held until the other hand is withdrawn from the vagina and presses the breech upward.

Cephalic version is not performed by the internal method alone on account of the difficulty of seizing the head and retaining it in position.

2. PODALIC VERSION.—This variety of turning is the one most frequently employed, being indicated when cephalic version is contra-indicated or cannot be readily performed, and in certain cases of placenta prævia, flattened pelvis, prolapse of the cord, or where rapid delivery is necessary.

It can be performed by the *combined method* or by the *internal method* alone.

(*a*) **Combined method** (*bi-polar*). The operation may be performed by this method at an early stage of labor, and when the os is only enough dilated to admit the fingers, provided the amniotic liquor has not drained away so completely that the uterine wall is closely contracted about the fœtus. The patient may lie on her back or left side, and either hand may be introduced into the vagina.

The presentation being that of the head, the fingers are passed within the cervix and the head pushed upward in the direction of the occiput, while the external hand pushes the breech downward in the direction of the abdomen of the fœtus.

When the shoulder arrives at the os it should be pushed in the same direction as the head; as soon as a knee or foot is felt it must be grasped by the fingers and the membranes immediately ruptured, if they have not been ruptured already.

Traction should then be made on the leg until the greater part of the thigh has passed through the os. It generally makes no difference which leg is seized, but in cases of flattened pelvis, where there is more room on one side than on the other, the occiput should be brought to the wider side by seizing the leg which corresponds to that side.

When the presentation is that of the shoulder, cephalic version is generally indicated; but if the membranes are intact or have not been long ruptured, podalic version by the combined method may be attempted in the manner just described.

(*b*) **Internal method.** This method is the one most frequently employed, and if attempted before escape of the amniotic liquor is not difficult. The patient may lie on her back or left side; the dorsal aspect of the finger, hand, and forearm having been well oiled, the whole hand (right or left) in the form of a cone should be slowly passed into the vagina and gradually inserted within the uterus until the palm of the hand rests on the child's abdomen.

If the membranes be now ruptured escape of the waters is prevented by the hand and arm which act as a plug; the hand may be pressed up until a knee or foot is reached, either of which should be gently drawn downward, assistance being meanwhile given by the external hand in pushing down the breech and in elevating the head.

If the os is well dilated both limbs may be brought down; if it is only partially dilated, and one of the limbs remains flexed on the body of the child, the other limb only should be brought down.

In presentations of the shoulder it is preferable to seize the lower leg or that on the same side as the presenting shoulder (Galabin); many authorities, however, recommend the seizure of the opposite limb.

When all of the amniotic liquor has escaped the uterus becomes tightly contracted on the fœtus and the shoulder is impacted in the pelvis; in such cases version is a most difficult and dangerous operation.

If the attempt at version fails, mutilation of the fœtus will be necessary.

The use of anæsthesia in version is regulated by the variety of the operation, the methods employed, and the difficulties encountered.

Cephalic version may be performed without an anæsthetic, especially if the membranes are unruptured.

Podalic version may also be performed without an anæsthetic under the same circumstances; but in either case if the uterine contractions are active, partial or complete anæsthesia will be found of great assistance.

In all difficult cases complete anæsthesia is necessary.

Attempts at version should be made only during the intervals between the pains; if a uterine contraction occur while the operation is being performed, the hand must remain motionless until the contraction has ceased.

CHAPTER IV.

EMBRYOTOMY.

An operation involving destruction and mutilation of the child in order to facilitate or render possible its extraction. It is performed in the interest of the mother only, being justifiable in cases where any other procedure is likely to prove fatal to her; some authorities condemn the operation as unjustifiable while the child is alive.

The *indications* for embryotomy are: Want of proportion between the fœtus and the birth canal, as great size of the head or of the entire fœtus, narrowing or obstruction of the pelvis (conjugate diameter less than three inches and greater than one and a half inches);

failure in the normal mechanism of labor, especially where there is impaction of the shoulder or face;

Death of the fœtus (where artificial extraction is necessary).

The *varieties* of the operation are: *Craniotomy; decapitation; evisceration.*

I. CRANIOTOMY.—The stages of this operation are two: perforation, and extraction.

(*a*) **Perforation.** Before commencing the operation the bladder and rectum should be emptied, and the patient placed on her back with the hips drawn over the edge of the bed; if extraction is to be performed immediately after perforation the os must be well dilated before commencement of the operation. An anæsthetic is usually not necessary.

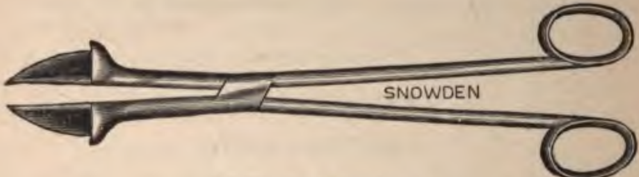

FIG. 40.—Smellie's scissors.

In order to keep the head in its position the hands of an assistant should make pressure through the abdominal wall; the obstetric forceps are sometimes applied to the head for this purpose.

Perforators are of various forms; in most of them the pointed blades are separated and made to do their cutting by approximating the handles. Two fingers of the left hand having been introduced within the vagina, the perforator, held by the right hand, is gently passed along their palmar surfaces and guided to the presenting part of the skull.

The instrument is held perpendicular to the head and made to perforate it by firm pressure combined with a boring movement, the sutures and fontanelles being avoided if possible, as they are likely to be closed when the bones are compressed.

When the blades have penetrated as far as their shoulders the cut is made by approximating the handles; the instrument is now turned and a similar cut made at right angles to the first, after which it is thrust deep into the brain-substance and moved about in order to thoroughly break up the latter; the instrument is then carefully withdrawn.

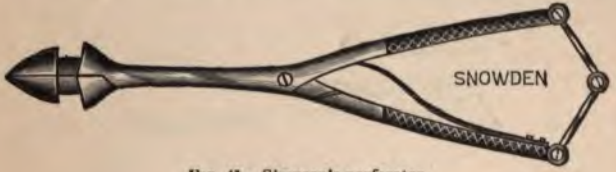

FIG. 41.—Simpson's perforator.

As the brain-substance escapes the cranial bones usually collapse.

(*b*) **Extraction.** If there be no necessity for rapid delivery, the pains still being active, a short delay of a few moments between perforation and extraction will allow the skull to collapse and become moulded to the cavity of the pelvis.

Extraction may be effected with the obstetric forceps, craniotomy forceps, cephalotribe, cranioclast, crotchet, the blunt hook, by version, or by lamination.

The *ordinary obstetric forceps*, on account of the slight compression which can be exerted, is generally not serviceable; when the operation has been performed with this instrument in position on the head extraction may be attempted with it.

Craniotomy forceps should be introduced with one blade through the perforation and the other outside the scalp; traction may be made during the pains to bring the head down if possible; but should the obstruction be great it will be necessary to break up and remove the cranial bones. The objection to this method of extraction is the risk of injuring the maternal structures.

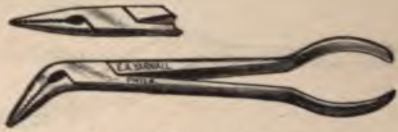

FIG. 42.—Craniotomy forceps.

The *cephalotribe* acts as a crusher and tractor. It consists of two strong blades which can be approximated by a screw attached to the handles. The blades which have a slight pelvic curve are applied in the same manner as those of the obstetric forceps; when they are in position the crushing can be done by slowly turning the screw; extraction may then be effected by making traction in the axis of the pelvis, during the pains if possible.

Care should be taken that spiculæ of bone do not project and cause injury.

In some cases after one part of the head has been crushed it may be necessary to remove the instrument and apply it to some other part.

When there is not too great pelvic deformity cephalotripsy is the safest and easiest method of extraction.

The *cranioclast* is a powerful craniotomy forceps. One blade is passed between the cranial bones and the scalp, the other through the perforation in the skull; the bone is then grasped and twisted until it is detached and can be drawn out, this process of detachment and extraction being continued until the entire cranium has been removed. This method of extraction is not only tedious but dangerous.

The *crotchet*, a sharp-pointed hook, was formerly much used for extraction; as it is liable to slip or break through the bone to which it is attached and cause injury to the maternal structures, its use has been almost abandoned.

The *blunt hook* is a safer instrument and may be used to draw down the chin or thrust into an orbit; when the after-coming head has been perforated traction may be made with this instrument inserted at the base of the skull.

Version with extraction of the feet first has been recommended by some authorities and condemned by others.

Lamination, or division of the head into two or more segments, has been performed by use of the *forceps saw*, but is of doubtful utility.

2. DECAPITATION.—This operation is indicated in neglected shoulder presentations where turning cannot be effected.

The methods by which it may be performed are:—

Division of the neck with a blunt-pointed pair of scissors, the neck having been drawn down by pulling on an arm until the blunt hook can be applied;

Division of the neck by means of a sharp hook, a piece of cord, or a wire écraseur.

After decapitation, delivery of the body is usually not difficult, delivery of the head being effected with the cephalotribe or blunt hook.

3. EVISCERATION.—The opening and evacuation of the large cavities of the trunk.

This operation should only be resorted to when the neck is inaccessible. The chest may be opened with the perforator or scissors; after some of the contents have been removed the fœtus may be doubled on itself and extracted by means of the crotchet or blunt hook.

CHAPTER V.

ABDOMINAL SECTION.

The operation for removal of the fœtus through the abdominal wall has been performed according to various methods for many years; the results of the operations have been to a large extent unfavorable.

It should be undertaken in the interest of the mother only; but if she has died the object will then be to extract a living child.

The *indications* for the operation are: Want of proportion between the fœtus and the birth-canal,—as narrowing or obstruction of the pelvis, the conjugate diameter being less than one and a half inches, and the transverse diameter which bisects it less than three inches,—so that delivery cannot be effected by *embryotomy* without greater risks to the mother;

Death of the mother during labor or during the latter months of pregnancy.

The operation should be undertaken at an early stage of labor before the patient has become exhausted,—the high mortality being due in great part to delay and fruitless efforts at extraction by other means.

The varieties of the operation are:—

Cæsarean section (*Gastro-Hysterotomy*);

Porro's Operation (*Gastro-Hysterectomy*);

Porro-Müller Operation;

Laparo-Elytrotomy (*Gastro-Elytrotomy*).

I. CÆSAREAN OPERATION.—The variety of abdominal section first performed for the extraction of the fœtus. Before commencing the operation the bladder and rectum should be empty, the os at least partially dilated, and the membranes ruptured in order to permit escape of the amniotic liquor. The patient must be anæsthetized and arranged for the operation as in ordinary cases of abdominal section.

An incision six inches in length is made in the linea alba; after all bleeding has ceased the peritoneum may be divided in the extent of the external incision when the uterus will be exposed.

The uterus having been pulled forward by an assistant, an incision is quickly made through the middle of the anterior wall; when the membranes have been reached a director is passed in and the incision carried upward almost as far as the external one, care being taken not to cut through the placenta if possible.

The edges of the uterine incision are now hooked up against the abdominal wall so as to prevent escape of blood and amniotic liquor into the peritoneal cavity.

The child may be extracted by seizing the head or the feet; the cord should be immediately tied and divided.

The placenta may be detached and removed at once or allowed to remain for a few minutes until the blood in the sinuses has coagulated, good contraction of the uterus being meanwhile secured by grasping and compressing it with the hand.

If the hemorrhage is not checked by this means the placenta should be immediately removed, and an application of Monsel's solution of iron made to the placental site.

The uterine and peritoneal cavities having been cleansed, and the uterine and abdominal sutures applied, the dressings and subsequent treatment are carried out with the usual antiseptic precautions.

2. PORRO'S OPERATION.—The removal of the uterus, tubes, and ovaries after Cæsarean section has been performed.

After removal of the child the uterus is drawn out through the abdominal wound, and the écraseur applied below the ovaries and the lower end of the uterine incision; the écraseur having been tightened so that all hemorrhage is checked, the uterus with its appendages is cut away about an inch above the loop.

The stump should be kept outside the abdominal wound, the clamp and transfixion pins resting upon the surface on each side of the incision.

The usual antiseptic precautions must be used.

3. PORRO-MÜLLER OPERATION.—A modification of the Porro operation in order to prevent hemorrhage from the divided uterine tissue. The abdominal incision must be made sufficiently large for the entire uterine mass with its contents to be brought outside; the lower part of the uterus is then constricted and the child extracted.

The great length of the abdominal incision, and the difficulty of bringing the uterus outside, are thought by some to increase rather than diminish the risks of the operation.

4. LAPARO-ELYTROTOMY.—A substitute for the preceding operations, by means of which the opening of the peritoneal cavity and incision of the uterus are avoided.

The os having been sufficiently dilated for the child to be drawn through the cervix, the operation is commenced by making an incision parallel to Poupart's ligament and about six inches in length, the line of the incision extending from a point about one and a half inches above and to the outside of the pubis to another point about one inch above the anterior superior spine of the ilium. The right side is the one usually chosen for the operation, although it can be done on the left.

By drawing the uterus to the side opposite that selected for the operation the tissues are put on the stretch, and on this account are more easily dissected.

When the peritoneum has been reached it must be carefully separated from the adjacent tissues, and lifted up that the vaginal wall may be brought into view.

A small transverse incision having been made through the vagina, both index fingers are inserted and the opening enlarged to the necessary extent by tearing the tissues that hemorrhage may be avoided.

The cervix is then drawn into the opening thus made in the vagina, and the os being well dilated, and the membranes ruptured, the child may be extracted by simple traction, by means of the forceps, or by version.

This operation, although more difficult than the preceding ones, if skillfully performed should increase the mother's chances of recovery.

APPENDIX.

UNIFORMITY IN OBSTETRICAL NOMENCLATURE.

THE report as accepted by the Obstetric Section of the Ninth International Medical Congress, held in Washington, D. C., September, 1887.

A. It is desirable to try to attain to uniformity in obstetrical nomenclature.

B. It is possible to arrive at uniformity of expression in regard to: 1st. The Pelvic Diameters; 2d. The Diameters of the Fœtal Head; 3d. The Presentations of the Fœtus; 4th. The Positions of the Fœtus; 5th. The Stages of Labor; 6th. The Factors of Labor.

C. The following definitions and designations are worthy of general adoption by obstetric teachers and authors:—

I. PELVIC BRIM DIAMETERS.

1. **Antero-Posterior.** (1) Between the middle of the sacral promontory and the point in the upper border of the symphysis pubis crossed by the *linea-terminalis* = *Diameter Conjugata Vera,* C. V. (2) Between the middle of the promontory of the sacrum and the lower border of the symphysis pubis = *Diameter Conjugata Diagonalis,* Cd.
2. **Transverse.** Between the most distant points in the right and left ileo-pectineal lines = *Diameter Transversa,* T.
3. **First Oblique.** Between right sacro-iliac synchondrosis and left pectineal eminence = *Diameter Diagonalis Dextra,* D. D.

4. **Second Oblique.** Between left sacro-iliac synchondrosis and right pectineal eminence = *Diameter Diagonalis Læva*, D. L.

II. FŒTAL HEAD DIAMETERS.

1. From the tip of the occipital bone to the centre of the lower margin of the chin = *Diameter Occipito-Mentalis*, O. M.
2. From the occipital protuberance to the root of the nose = *Diameter Occipito-Frontalis*, O. F.
3. From the point of union of the neck and occiput to the centre of the anterior fontanelle = *Diameter Sub-Occipito-Bregmatica*, S. O. B.
4. Between the two parietal protuberances = *Diameter Bi-Parietalis*, Bi-P.
5. Between the two lower extremities of the coronal suture = *Diameter Bi-Temporalis*, Bi-T.

III. PRESENTATION OF THE FŒTUS.

The *presenting part* is the part which is touched by the finger through the vaginal canal, or which, during labor, is bounded by the girdle of resistance.

The *occiput* is the portion of the head lying behind the posterior fontanelle.

The *sinciput* is the portion of the head lying in front of the *bregma* (or anterior fontanelle).

The *vertex* is the portion of the head lying between the fontanelles and extending laterally to the parietal protuberances.

Three groups of presentations are to be recognized, two of which have the long axis of the fœtus in correspondence with the long axis of the uterus, while in the third the long axis of the fœtus is more oblique or transverse to the uterine axis.

1. **Longitudinal.** (1) *Cephalic*, including vertex and its modifications; face and its modifications; (2) *Pelvic*, including breech and feet.
2. **Transverse** or trunk, including shoulder, or arm and other rarer presentations.

IV. POSITIONS OF THE FŒTUS.

The positions of the fœtus are best named topographically, according as the denominator looks—first, to the left or right side, and second, anteriorly or posteriorly. When initial letters are employed it is desirable to use the initials of the Latin words.

In the case of *vertex* positions we have :—

Left Occipito-Anterior — *Occipito-Læva Anterior,* O. L. A.
Left Occipito-Posterior — *Occipito-Læva Posterior,* O. L. P.
Right Occipito-Posterior — *Occipito-Dextra Posterior,* O. D. P.
Right Occipito-Anterior — *Occipito-Dextra Anterior* O. D. A.

The *face* positions are :—

Right Mento-Posterior — *Mento-Dextra Posterior,* M. D.P.
Right Mento-Anterior — *Mento-Dextra Anterior,* M. D. A.
Left Mento-Anterior — *Mento-Læva Anterior,* M. L. A.
Left Mento-Posterior — *Mento-Læva Posterior,* M. L. P.

The *pelvic* positions are :—

Left Sacro-Anterior — *Sacro-Læva Anterior,* S. L. A.
Left Sacro-Posterior — *Sacro-Læva Posterior,* S. L. P.
Right Sacro-Posterior — *Sacro-Dextra Posterior,* S. D. P.
Right Sacro-Anterior — *Sacro-Dextra Anterior,* S. D. A.

The *shoulder* presentations are (left and right side of the mother) :—

Left Scapula-Anterior — *Scapula-Læva Anterior,* Sc. L. A.
Left Scapula-Posterior — *Scapula-Læva Posterior,* Sc. L. P.
Right Scapula-Posterior — *Scapula-Dextra Posterior,* Sc. D. P.
Right Scapula-Anterior — *Scapula-Dextra Anterior,* Sc. D. A.

V. THE STAGES OF LABOR.

Labor is divisible into three stages :—

1. **First Stage.** From the commencement of regular pains till complete dilatation of the os externum — *Stage of Effacement and Dilatation.*
2. **Second Stage.** From dilatation of os externum till complete extrusion of child — *Stage of Expulsion.*
3. **Third Stage.** From expulsion of child to complete extrusion of placenta and membranes — *Stage of the After-birth.*

VI. THE FACTORS OF LABOR ARE: (1) *The Powers.* (2) *The Passages.* (3) *The Passengers.*

(*Signed*) De Laskie Miller, M.D.,
President of the Section.
A. F. A. King, M.D.,
William T. Lusk, M.D.,
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